

LLOYDIA

A Quarterly Journal of Biological Science

Published by the Lloyd Library and Museum, Cincinnati, Ohio

The Tropical American Genus *Sclerolobium* Vogel (Caesalpiniaceae)

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This paper is a sequel to my recent treatment of the systematics of the tropical New World genus *Tachigalia* Aublet of the tribe Amherstieae.¹ Recently in proposing an experimental key to the world-wide genera of the pan-tropical tribe Amherstieae I noted that Tulasne in 1844 recognized a "grande affinité" between *Tachigalia* and *Sclerolobium* Vogel, the type genus of the tribe Sclerolobieae.² The tribe Sclerolobieae with only nine additional genera: *Diptychandra*, *Batesia*, *Campsiandra*, *Melanoxylon*, *Recordoxylon*, *Dicymbe*, *Cenostigma*, *Phyllocarpus*, and *Thylacanthus* contains less than 55 species. The tribe has been virtually neglected since Bentham's classic treatment in 1876 and Capitaine's cursory survey in 1912.³ In my paper I suggested the merger of the strictly tropical American tribe Sclerolobieae with the vast tribe Amherstieae (*in sensu lato* to include the Cynometreae). So closely related seem to be certain species of the two genera that the only gross distinguishing character of substance is the position of the stipe of the pistil with reference to the receptacle-cup. In *Sclerolobium* it is attached centrally in the receptacle-cup, while in *Tachigalia* it is eccentric. In addition the legumes of both genera are strikingly similar, although only about one-half of the species of *Sclerolobium* is known from the fruiting stage, and about one-third in *Tachigalia*.⁴ Equally impressive is the fact that some species in both genera exhibit myrmecophily. This is known in only three genera of the family Caesalpiniaceae:

¹The tropical American genus *Tachigalia* Aubl. (Caesalpiniaceae). Ann. Mo. Bot. Garden **41**: 223-260. Pls. 9-10. 1954.

²Rapports et Communications de Huitième Congrès International de Botanique. Section 2. 52-54. 1954.

³Bentham, George. Caesalpiniaceae. In Mart. Fl. Bras. 15²: 41-254. 1876.

Capitaine, L. Étude Analytique et Phytogéographique du Groupe des Legumineuses. 1912.

⁴The generic name *Sclerolobium* is derived from two Greek words meaning "hard" and "lobe of ear" respectively; this refers to the consistency and somewhat ear-lobed outline of many of the fruits of the sclerolobiums.

Platymiscium Vogel and in the two genera under discussion. Common names like the Indian (Guiana) name "tachi" (stinging ant) are applied indiscriminately to certain species of both *Tachigalia* and *Sclerolobium*. In addition to my discussion of myrmecophily in the paper on *Tachigalia*, data may be found in Ducke & Black's paper, Phytogeographical Notes on the Brazilian Amazon (in Dos Anais da Academia Brasileira de Ciencias 251: 5. 1953); this includes a key to the myrmecophilous genera of Brazil. The geographical distribution of both genera is somewhat similar, although *Tachigalia*, unlike its ally, has not been reported from Ecuador and Bolivia, while *Sclerolobium* has not been collected outside tropical South America. The center of distribution of both genera is unquestionably in Amazonian Brazil. Apparently the State of Rio de Janeiro is a secondary center in the case of *Sclerolobium* (cf. section *Oriens*).

Another genus to which *Sclerolobium* is obviously very closely related is *Diptychandra* Tulasne, which Baillon states in his *Histoire des Plantes* 2: 92.1870, has "Les mêmes fleurs que les *Sclerolobium* de la section *Cosymbe*."

HISTORY OF THE GENUS

The significant facts, pertaining to the history of *Sclerolobium*, and these are few, may be found in Baillon's *Histoire des Plantes* (Sous-Famille des Caesalpiniées 2:73-196 1870). Therein one finds eight of the ten genera currently placed in the tribe Sclerobieae. *Dicymbe* Spr. ex Benth. and *Recordoxylon* Ducke were appended to the tribe in 1865 and 1934, respectively. For some reason Baillon's work does not include *Dicymbe*.

Sclerolobium, established in 1837, has not been confused with other genera except in part by Tulasne and Martius. In Bentham's work of 1876 (loc. cit.) only ten species of *Sclerolobium* are listed. Since that time new species have been added occasionally, without the genus being subjected to critical monographic study. Adolfo Ducke, since 1935, has described eight new species from Amazonian Brazil, all of which are sharply defined. The present treatment recognizes thirty four species of *Sclerolobium*, three of which are new. Four varieties are described as new.

Critical notes on *Sclerolobium* are to be found in several limited treatments of the genus, especially those of G.J.H. Amshoff, J. F. Macbride, and A. Ducke.⁵

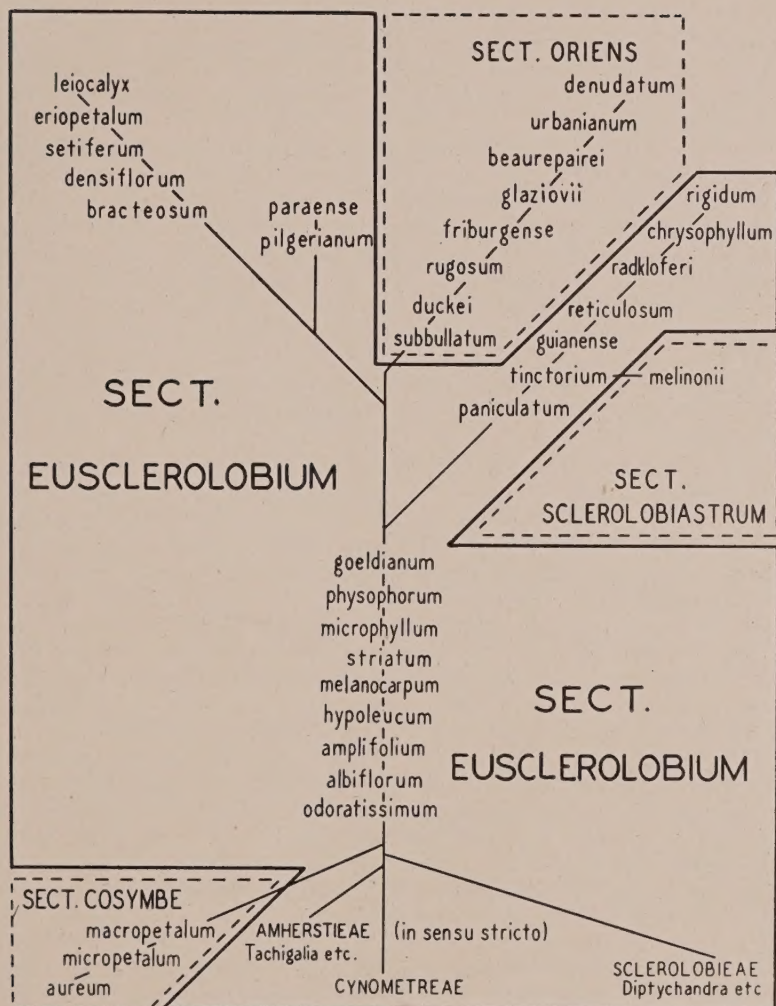
MORPHOLOGICAL CHARACTERISTICS

Stipules.—Unfortunately the stipules are soon deciduous in most species and hence are not very useful in taxonomic work. In *S. paraense*, however, they are of value as a specific character, being very large and often persistent in contrast to those of other species. In *S. guianense*,

⁵Ducke, A. *Sclerolobium* in Arch. Inst. Biol. Veg. Rio de Janeiro 2: 41-43. 1935. Amshoff, G.J.H. *Papilionaceae* in Pulle's *Flora of Surinam* 11, Part 2: 90-93. 1939.

Macbride, J.F. *Sclerolobium* in *Flora of Peru* Vol. XIII, Part 3: 199-203. 1943.

Ducke, A. *Sclerolobium* in *Notas Sobre a Flora Neotropica II* in Boleim Técnico do Instituto Agronomico do Norte (Belém) 18:131. 1949.



S. tinctorium and in several other closely related species they are unique in that the segments are pectinate. One can infer, in the case of leaves estipulate at maturity, that the presumptive stipules are pectinate, if one finds bracts persistent at the base of very immature panicles. Invariable pectinate stipules and bracts occur on the same material.

Myrmecophily.—In the literature *S. odoratissimum* and *S. physophorum* are reported as possessing myrmecodomatia.⁶ Certain collections of *S. subbullatum* exhibit petioles with a myrmecodomatium; one collection of the type of *S. rigidum* deposited in Kew has a very well-

⁶Bequaert, J. Ants in their relation to the plant world. In Wheeler, W.M. Ants of the Belgian Congo. Amer. Mus. Nat. Hist. Bull. 45: 333-583. Pls. 26-29. 1921-1922.

defined myrmecodomatium. Occasional collections of *S. uleanum*, *S. rugosum*, *S. chrysophyllum*, and *S. aureum* have tumescent leaf rachises; in several species, the rachis of the panicle occasionally appears swollen. The myrmecodomatia of the sclerolobiums appear homologous with those of the tachigalias.

Leaves.—I have not encountered any collection of *Sclerolobium* with unijugate leaves. I found that leaves are regularly paripinnate, despite many statements in the literature to the contrary. Occasionally imparipinnate leaves are encountered. Several species, e.g., *S. aureum*, *S. eripetalum*, etc. show leaf rachises terminated by a slender and weakly attached extension. Students of the tribe Amerstieae, e.g. Schinz (Verh. Bot. Ver. Brand. 30: 170. 1889), Léonard (Bull. Jard. Bot. Bruxelles 19 (4): 388. 1949), and Cowan (Mem. N.Y. Bot. Garden 8 (4): 261. 1953) have remarked on the presence of this structure, considering it to be a rudiment of the rachis; the latter two workers apparently agree with the opinion of Schinz who "la considère comme une troisième foliole très réduite."

The characters of the leaflets found most useful by taxonomists are their number, shape, vesture, and the number of the secondary veins. About one-half of the species has no more than five pairs of leaflets; several possess leaves which have two-to-three pairs of leaflets. The leaflets are occasionally subchartaceous but are usually coriaceous; they are usually inequilateral and oblong to elliptic in shape; the apex is vaguely to obviously acuminate, although most collections of *S. aureum* are strikingly obtuse at the apex. The base of the blade is usually inequilateral with the wide side often terminating on the petiolule below the point of union of the narrow side. In some collections of *S. aureum* the narrow side may join the costa below the wide side.

The vesture of the leaflets is of course, very variable, and should be studied under magnification; the hairs show considerable difference in size, density, and in one species, *S. melinonii*, shape. Occasionally very short hairs, especially on the vegetative organs, will be found associated with longer and more erect hairs. In some species the hairs of the leaflets are frequently deciduous; the major secondary veins and their branches frequently retain their pubescence.

Varieties distinguished solely on the relative density of the pubescence of the vegetative organs and rachises of the inflorescence should be viewed with suspicion. On the other hand glabrous foliage is an important character and apparently a stable one. If the upper surface of the costa (near its junction with the petiolule) is glabrous, one will invariably find that the remainder of the blade of the leaflet is glabrous. Leaflets which are consistently glabrous are found only in five species: *S. macropetalum*, *S. paraense*, *S. urbanianum*, *S. pilgerianum*, and *S. denudatum*.

The majority of species shows the upper surface of the blade to be of a darker color than the lower surface. Certain species with leaflets golden pubescent below, are exceptionally attractive. The number of major secondary veins does not always increase proportionately when small-leaflet species are compared with species bearing large leaflets. *S. albiflorum*, for example, with leaflets up to 26 cm. long, usually averages six to seven major secondary veins per side, while *S.*

hypoleucum, with leaflets not exceeding 7 cm. in length, averages about six principal veins. The majority of the species has the secondary veins curving from the costa; several species have a more strict pattern of venation, e.g. *S. micropetalum*. Textural features characterizing the surface of most species are often difficult to describe. Numbered among the exceptions are the honeycomb appearance of the veinlets of *S. amplifolium*, the rugose character of the upper surface of *S. rugosum*, *S. densiflorum*, etc., the reticulate surface of the leaflets of *S. aureum*, *S. paniculatum* var. *paniculatum*, etc. all of these are obvious and usable features. The margin of the leaflets shows little differentiation except in a few species wherein it is somewhat more revolute than usual.

Inflorescence.—From a practical viewpoint the usable morphological characteristics of the inflorescence are few. This is reflected in the sketchy character of the descriptions of the same, as exemplified by many type descriptions. In attempting to work out specific differences in the morphology of the inflorescences of any species one must contend immediately with the difficulty of delimiting the strictly terminal panicle from the numerous adjacent axillary panicles (often several per axil). This is due primarily to the fact that the uppermost leaves often are fugacious and the stipules invariably are deciduous from the twigs before anthesis; this makes it difficult to ascertain whether one is observing an axillary inflorescence or a branch of an inflorescence. When stipules are present, they may well mark the position of the leaves. The fact that the collections are attached to herbarium sheets, and hence are not observed readily from different angles, adds to the task of deciding whether one is observing an axillary inflorescence or a branch of an inflorescence.

The width and, to some extent, the shape (in cross-section) of the rachis have some value as diagnostic characters. The branching habit of the inflorescence, however, is so variable intraspecifically that it is of little importance as a key character. Measurements of the width of the base of the cylindrical or narrowly pyramidal racemes have some value. The consistently subulate bracteoles occasionally persist at the pedicel base. In *S. goeldianum*, *S. bracteosum*, and *S. aureum* var. *grandiflorum* these apparently are persistent and more than twice the length of the youngest buds.

Flowers.—In *Sclerolobium*, flowers are usually numerous. These measure from 3–6 mm. in length and are ideally suited for dissection under magnification.

The receptacle-cup is thin-walled, and except for a few species, e.g. *S. macrophyllum* and *S. leiocalyx* is carnosose. In the latter this condition, plus the smallness of the receptacle-cup itself, leaves little space within. In most species the cavity of the cup is spacious, and, as is characteristic of so many genera of the Caesalpiniaceae, the interior is glabrous. The external pubescence of the cup is not a useful character. In longitudinal section the receptacle-cup appears subequilateral to somewhat inequilateral, although the latter condition may be due in part to the pressed condition of the flower. In general the chief taxonomic feature of the receptacle cup is the uniform attachment of the stipe of the pistil to its very base. As for the calyx lobes there is little variation interspecifically in shape, size, and texture. Inasmuch as the majority of species has

pubescent sepals, more attention may well be directed to this feature. The variation in density and length of hairs is difficult to describe. Only rarely are the hairs at the very base of the sepals on the inner face densely shaggy, e.g. in *S. paraense*. The relative density and length of hairs on the margin of the sepals are useful only as supplementary characters. In one species, *S. leiocalyx*, the inner sepals are consistently glabrous on the exterior surface.

In the array of floral characters the most important are the shape and the pubescence or the glabry, of the petals. In the present paper, segregation of section *Cosymbe* from the other two sections whose petals are linear, is based primarily on the width of its petals. Only occasionally do petals from Section *Eusclerolobium* deviate from being linear or linear-subulate; in many species of section *Oriens* there seems to be a tendency on the part of the petals to be clavate.⁷ When pubescent, the petals have the hairs restricted to the adaxial surface.

In linear petals the mid-vein is often evident. Several species have glabrous petals. Those petals with numerous hairs usually are plumose in appearance. The fact that densely pubescent petals may lose their hairs on being dissected, suggests the need for handling them with care.

The stamens are regularly ten in number, although Harms in his type description of *S. beaurepairei* states that the stamens are "8-10". The anthers typically are glabrous and in most species measure 1.0-1.5 mm. in length. *S. micropetalum*, with anthers measuring only 0.5 mm. in length, is readily segregated by this character. The filaments from a single flower are usually of the same shape and width, although linear and subulate filaments in the same flower are not uncommon. The tendency to have three of the ten filaments considerably thicker, as found in many of the tachigalias, is not found in *Sclerolobium*, although they may vary somewhat in width especially in section *Oriens*.

The filaments are always pubescent. The hairs in some species are not confined to the adaxial surface but extend to the abaxial surface; in this event they are not as dense or as long as on the inner side. In general the pubescence of the filaments of the stamens provides the strongest staminal character. The deflexed habit of some of the spike-like hairs in four species of section *Oriens* is deserving of note.

The pistil of the sclerolobiums is always attached to the base of the receptacle-cup by a stipe which rarely exceeds 1.2 mm. in length. The ovary, consistently oblong in shape, frequently has the hairs confined to the sutures, e.g. in *S. eriopetalum* and *S. setiferum*, or has, in addition to the hairs on the sutures, only scattered hairs on the valves. Such limitation in the distribution of the ovarian hairs is the most useful character of the pistil. The style is consistently linear-subulate and glabrous. In several species (section *Oriens*) it is considerably reduced in length (less than 1.3 mm.). The stigmatic surface exhibits no clear-cut differentiation. The ovules, ranging from 3-10 in the genus, rarely show a variation in count from two to three in any single species.

Fruit.—Few species of *Sclerolobium* are known from fruiting collections. This means the virtual elimination of the all important fruit from the key to species. In the entire key the character of the fruit is

⁷In certain African genera of the Amherstieae, e. g. in *Brachystegia*, *Afzelia*, *Berlinia* etc. the petals are notoriously inconstant in shape in many species; oft-times they are rudimentary.

employed in only three couplets. This is unfortunate inasmuch as fructiferous material gives evidence of considerable variation interspecifically. Apparently the legumes are indehiscent, although the smooth and often reticulate exocarp usually exfoliates at maturity. Several species are known to have glaucous legumes.

INTERSPECIFIC RELATIONSHIPS

The relationships existing between the various species of *Sclerolobium* as presented in this paper, do not agree in most cases with those proposed by various authors in their descriptions of new taxa. The proposal of two new sections, making a total of four: Cosymbe, Eusclerolobium, Sclerolobiastrum, and Oriens, should not be suprising, considering that Taubert's treatment, dated 1892, treats only 11 species in two sections. More recent authors, e.g. Harms and Ducke, in establishing interspecific relationships, have limited their observations to those species falling into the geographical areas of their special interest, e.g. Ducke to Amazonian Brazil. In addition little attention has been directed to certain very critical floral characters: the presence or absence of pedicels, the pattern of the distribution of the hairs of pubescent petals, the distribution of the hairs of the ovary, and the length of the style. As I observed in studying *Tachigalia*, a number of authors in their original descriptions have subordinated floral characters (except principally pubescence and measurements of floral parts) to less substantial vegetative characters, e.g. the number of leaflets, the density of the pubescence etc.

A glance at the diagram (fig. 1) of my concept of the phylogenetic lines in *Sclerolobium* shows that section Cosymbe, with its broad petals, is considered primitive. Its trio of species is perhaps closely related to the tachigalias, at least as evidenced by floral structure, and in the case of one species, in the habit of the inflorescence. The panicle of *S. macropetalum* with its few branches resembles to some extent the habit of the inflorescence of certain species of *Tachigalia*. Likewise the consistently wide petals of the section Cosymbe are much like those found in *Tachigalia*, as well as in *Diptychandra*, except that the hairs on their inner face are scattered. The Brazilian *T. myrmecophila* and the Peruvian *T. tessmannii* appear most closely related to the sclerolobiums,⁸ especially in that the former has a small receptacle-cup and petals only scattered-pubescent within, the latter a small and subequilateral receptacle-cup, monomorphic filaments of the stamens, and a stipe which is almost subcentral in its attachment to the cup.

Section Eusclerolobium with 22 species, is the largest of the four. The majority of these taxa is from the Amazonian region, well known for the wealth and diversity of its species.⁹ As would be expected among

⁸Ducke in initially describing the first species, placed it in the genus *Sclerolobium*.

⁹Of the 5 species recently described as new by Ducke and placed in section Eusclerolobium two are from Manáus, and two are endemic to São Paulo de Olivença, Amazonas. The fifth is from the state of Pará. Six additional species in this section have been described from the latter state by other authors.

In section Cosymbe two of the three constituent species were described by Ducke, one, *S. macropetalum*, from the upper Rio Negro, Amazonas, and the other *S. micropetalum* from Manáus, Amazonas. The other two sections of the genus are extra-Amazonian, except for one species.

so many species an array of diverse morphological characters appears, indicative of the successful establishment and evolution of the genus, e.g. the well-defined myrmecodomatia on the petioles in two species,⁹ reduction in the number of secondary veins of very large leaflets in two species, restriction of pubescence to sutures of ovary in seven species, and pectinate segments of stipules in six species.

The species which constitute the principal phylogenetic line of section *Eusclerolobium*, beginning with *S. odoratissimum* and extending to *S. macrophyllum*, have densely pubescent petals and ovaries which are uniformly pubescent throughout the entire surface. The initial branch of section *Eusclerolobium* segregates a complex of seven highly diversified species marked by an obvious reduction in the number of, or occasionally, the complete absence of, hairs on the valves of the ovary (not the sutures); the petals do not exhibit a comparable reduction in the density of their pubescence except in *S. densiflorum*, *S. pilgerianum* and *S. paraense*; these, by virtue of their completely glabrous foliage, are represented as a spur from the complex proper. Five of the seven species are known only from Amazonia.

The second main branch in section *Eusclerolobium* segregates a complex of very closely knit species; except for *S. paniculatum* (fide Fraga), *S. chrysophyllum*, and possibly *S. striatum* these do not appear in the State of Rio de Janeiro, the second distributional center of the sclerolobiums. All of the taxa show a marked reduction in the pubescence of the petals; in some flowers the petals are glabrous. In addition the petals retain their linear or subulate shape. The ovary is uniformly pubescent except in *S. tinctorium* in which the hairs are occasionally few on the valves. All of the species have stipules and bracts which apparently are deciduous, being found usually on very immature collections; no other species of the genus apparently possesses pectinate stipules except the complex under discussion (species #14 to 20). In these species the leaflets scarcely deviate from a pattern of 5 to 7 pairs. With the exception of *S. paniculatum* the flowers are sessile to subsessile.

In section *Sclerolobiastrum* its solitary species, the well collected *S. melinonii*, possesses a remarkable character: the stellate hairs of the vegetative organs; these are rather minute and the details of their morphology are not readily seen with an ordinary hand lens. Added to this are its chartaceous and very small leaflets and very polymorphic petals, apparently unmatched in variation by any other species of the genus. Its pedicellate flowers and general vegetative habit suggest an affinity with typical material of *S. paniculatum* var. *paniculatum* which also possesses chartaceous leaflets. Likewise in several other characters, particularly in the valves of the ovaries possessing few hairs, it shows an affinity with *S. tinctorium* (sect. *Eusclerolobium*).

In section *Oriens* seven of the eight species occur in the State of Rio de Janeiro and are represented by only a few collections; two of these occur also in the State of São Paulo, while one also occurs in Minas Geraes and Mato Grosso. Associated with the seven is *S. subbullatum* which is the only representative of section *Oriens* from Amazonian Brazil and in my opinion serves (at least tentatively) as a connecting link between it and section *Eusclerolobium*. Not only does the pattern of the geographical distribution of the species support their segregation

into a new section but also do foliage and floral characters. In the leaves of most species the costa and secondary veins are plane to obviously immersed; all the flowers are essentially sessile; the petals, while not densely hairy, are moderately so from apex to base, in this respect differing from all other complexes of species within the genus. In addition, the petals tend to be thicker, with more than half the species bearing some spike-like and deflexed hairs at the base. In the complement of eight species, all (except possibly one) have the hairs of the ovary uniformly distributed on the valves. In section *Oriens* one finds several species with their styles considerably reduced. With the exception of the single Amazonian *S. subbullatum*, the species have ovules ranging from 4 to 6 in number. Two species: *S. urbanianum* and *S. denudatum*, by virtue of the glabry of foliage, as well as other characters discussed above, appear to be the most advanced in section *Oriens*.

ECONOMIC IMPORTANCE

Apparently the sclerolobiums have only limited economic value. According to Hess & Record in *Timbers of Tropical America*, p. 325, 1924, the timber apparently has few uses, except in making charcoal and in local carpentry. Ducke in his *Notas Sobre a Flora Neotropica-II* (Bolem Técnico do Instituto Agronomico do Norte (Belém) 18: 131, 1949) indicates that the timber of the Amazonian species is of little use in construction, and the wood of *S. paniculatum* is used in the State of Pará to make a fine grade of charcoal. According to Pulle, Ducke adds, the same species is used in Surinam for making canoes. The bark of *S. tinctorium* has long been used in tanning and in making a dye.

In the 1943 edition of *Timbers of the New World* Hess and Record state that "the heartwood is pale to rather dark brown with a pinkish or olive twinge, sometimes with a satiny luster; scarcely distinct from the sapwood. Tasteless, but some specimens have a mild scent—easy to cut, but the fibers are likely to pull out in surfacing; takes nails without splitting; holds its place well when manufactured; does not appear very resistant to decay."

ACKNOWLEDGMENTS

I wish to express my appreciation to the Missouri Botanical Garden for the use of its herbarium and library facilities. Especial thanks are due to Mr. Phil Conrath who prepared the figure. I wish also to thank the directors of the institutions listed below who were kind enough to allow me to examine herbarium material of *Sclerolobium*. For purposes of citation a letter designating the particular institution is used:

Arnold Arboretum, Harvard University, Cambridge, Mass. (A).

Jardin Botanique de L'Etat, Bruxelles, Belgium. (B).

Chicago Natural History Museum, Chicago, Ill. (F).

Royal Botanic Garden, Kew, England. (K).

Missouri Botanical Garden, St. Louis, Mo. (MO.).

New York Botanical Garden, New York, N. Y. (NY).

Muséum National d'Histoire Naturelle, Laboratoire de Phanérogamie, Paris, France. (P).

Seccão de Botanica Sistemática, Jardim Botânico do Rio de Janeiro, Rio de Janeiro, Brazil. (R).

Botanisch Museum en Herbarium van de Rijksuniversiteit te Utrecht, Utrecht, Netherlands. (U).

Division de Botánica, Ministerio de Agricultura y Cria, Caracas, Venezuela. (V).

Naturhistorisches Museum, Botanische Abteilung, Wien, Austria. (W).

Yale University School of Forestry, New Haven, Conn. (Y).

TAXONOMY

SCLEROLOBIUM Vogel, in *Linnaea* 11: 395. 1837.

Tachigalia Tul., in part in *Arch. Mus. Nat. Paris* 4: 168. 1844, not Vog. 1837.

Trees.—Leaves 2–15-jugate, paripinnate or rarely imparipinnate; leaflets inequilateral or occasionally subequilateral, acuminate at apex, coriaceous or rarely membranaceous, the costa prominent below, the major secondary veins 4–15. Panicles numerous, crowded, the rachises elongate, often several per axil, much-branched, the branches with numerous flowers in racemes, the bracts deciduous before anthesis; bracteoles subulate, occasionally persistent. Flowers sessile to short-pedicellate. Receptacle-cup usually equilateral, minutely pubescent on outside; sepals 5, imbricate, the outermost pair often smaller and more carnose, pubescent or rarely glabrous on outside, the margin pubescent; petals 5, yellow or white, linear, clavate or oblong, glabrous to pubescent, the hairs few to dense on adaxial surface; stamens 10; filaments usually unequal in length, linear to subulate; anthers glabrous; stipe of pistil attached centrally to receptacle-cup; ovary oblong, entirely pubescent or hairs few or none on surface of valves, 3–10-ovulate; style glabrous. Legume flat, thin, smooth, often reticulate and marginate, the exocarp often separating unevenly at maturity, the remaining pericarp intact, enclosing 1 or 2 very thin seeds.

Nomenclatural type: *Sclerolobium denudatum* Vogel.

KEY TO THE SECTIONS OF *SCLEROLOBIUM**

Hairs of the vegetative organs simple; leaflets thin-coriaceous or coriaceous; all species of the genus included here except one.

Petals elliptic or oblong, 0.5–2.5 mm. wide (usually 1–2.5 mm. wide).

Section 1. *COSYMBE*.

Petals linear, linear-subulate to subclavate, 0.05–0.4 mm. wide.

Flowers pedicellate or subsessile; leaflets with upper surface with costa and veins prominulous or plane, rarely immersed; hairs of petals usually very dense, occasionally scattered or absent.

Section 2. *EUSCLEROLOBIUM*.

*In order to publish validly the new sections 3 and 4, the following latin descriptions are appended: *Sclerolobiastrum* Dwyer, sect. nov.: comae aliquae foliorum praecipue in foliolorum inferiore parte minute stellatae; foliola subchartacea. Species typica: *S. melinonii* Harms. *Oriens* Dwyer, sect. nov.: flores sessiles vel subsessiles; costa foliolorum immersa vel plana interdum prominula, venis secundariis immersis vel planis raro prominulis; petala plerumque comis paucis diffusis raro glabra. Species typica: *S. rugosum* Mart.

Flowers sessile to subsessile; leaflets with upper surface with costa and secondary veins immersed or plane, occasionally prominulous; hairs of petals usually few and scattered or absent.

Section 4. ORIENS.

Hairs of the vegetative organs, especially on the lower surface of the leaflets, minutely stellate; leaflets submembranaceous. Solitary species.

Section 3. SCLEROLOBIATRUM.

SECTION I—COSYMBE (Tul.) Baill.*

- a. Leaflets acuminate at apex, not markedly reticulate above; petals 0.6–2.3 mm. wide; ovules 5–7.
 - b. Leaflets in 2–3 pairs, glabrous; petals elliptic to oblong, 1.9–2.4 mm. wide; anthers about 1.5 mm. long; ovary covered entirely with hairs; legume smooth, not glaucous, elliptic, up to 5.5 cm. long1. *S. macropetalum*
 - bb. Leaflets in 7–8 pairs, pubescent; petals oblong to oblong-rotund, 0.6–1 mm. wide; anthers about 0.5 mm. long; ovary with hairs restricted to sutures; legume glaucous, elliptic to oblong, 10–20 cm. long2. *S. micropetalum*
- aa. Leaflets obtuse at apex (except var. *grandiflorum*), obviously reticulate above; petals 2–4 mm. wide; ovules 7–103. *S. aureum*

1. SCLEROLOBIUM MACROPETALUM Ducke, Arch. Inst. Biol. Veg. (1): 41. 1935. (T.: *Ducke* 23328!).

Branchlets smooth, somewhat canaliculate. Leaflets 2–3—jugate. Leaves up to 28 cm. long; petioles 4–6 cm. long, canaliculate, glabrous; rachis 3–4.5 cm. long; leaflets scarcely inequilateral, elliptic to oblong, up to 13.5 cm. long, up to 5 cm. wide tapering acutely, ultimately acuminate, occasionally subobtusate, subacute and scarcely inequilateral at base, coriaceous, lustrous, glabrous, the costa glabrous, plane above, about 0.7 mm. wide above, about 1.3 mm. wide proximally below, the major secondary veins 6–8, prominulous above, prominent beneath, arcuate-ascending, the margin vaguely revolute. Inflorescence not exceeding uppermost leaves, the panicles with branches few, the latter puberulent, up to 10 cm. long, about 0.15 cm. wide, usually with flowers along entire length, the flowers well spaced, the bracts not seen; bracteoles subulate, about 2 mm. long; pedicels slender, about 0.3 cm. wide, about 0.03 cm. wide, puberulent. Receptacle cup 1.3–2 mm. long; sepals 2.6–3.2 mm. long, glabrous, the margin villosulose; petals elliptic to oblong, 4–5.3 mm. long, 1.9–2.3 mm. wide, scattered hirsute at base within; filaments of stamens 4.5–8 mm. long, villose on all sides at base, the hairs curled, up to 1 mm. long; stipe of ovary about 1.1 mm. long; ovary about 2.2 mm. long, villose over entire surface, the hairs up to 1 mm. long, 5–6-ovulate; style about 3 mm. long. Legume apparently elliptic, up to 5.5 cm. long, up to 2.5 cm. wide, short acuminate at apex and base, tan, smooth, reticulate.

BRAZIL: AMAZONAS: Rio Negro, above mouth of Rio Curricurí: *Ducke*

*Taubert in his treatment of the Leguminosae in Engler & Prantl's Pflanzenfamilien (III³ 180. 1892) divides the genus into two sections on the basis of the width of the petals: "Sect. I Eusclerolobium Taub. Blb. fadenformig" and "Sect. II Platypetalum Taub. Blb.—verbreitet." The Section Cosymbe published earlier by Tulasne (loc. cit.) as a complex within the genus Tachigalia, takes precedence over Section *Platypetalum* inasmuch as it would seem that Baillon's transfer of Section Cosymbe to *Sclerolobium* was done in valid style (in *Histoire des Plantes* 2: 92. 1870).

42 (A, F, K, MO, NY, US), *Ducke* 23328 (F, frag., NY, U); São Felipe, upper Rio Negro, *Baldwin* 3579 (US).

S. macrophyllum is readily distinguished by its almost equilateral leaflets, which are few per leaf, glabrous and elliptic or occasionally oblong in shape. The most important floral character is the elliptic to oblong petals; these are the largest in the sclerolobiums, except for those of *S. aureum* var. *grandiflorum*. No other species of the genus has sepals completely glabrous, despite Ducke's statement that this condition exists in *S. micropetalum* and *S. leiocalyx* (Cf. Ducke's original description of these). The short and elliptic fruit resembles those of *S. leiocalyx*.

Ducke's statement (loc. cit.) that the pedicels attain to 6 mm. in length, is open to question. These do not exceed 3 mm. in the type material examined. In the entire genus I have not observed pedicels longer than 3.5 mm.

The compressed inflorescences with the rachises supporting the least number of branches observed in the sclerolobiums, are worthy of note; in this respect it bears a striking resemblance to the tachigalias.

Ducke (in Bol. Técn. do Instituto Agron. do Norte (Belém) p. 134. 1949) states that *S. macrophyllum* is also found in Amazonas, Brazil at Camanaus.

2. *SCLEROLOBIUM MICROPETALUM* Ducke, in Bol. Téc. Inst. Agron. Norte Belém 2:19. 1944. (T.: *Ducke* 1219).

Branchlets smooth, somewhat canaliculate. Leaflets 7-8—jugate. Leaves up to 25 cm. long; petioles slender, 3-4.5 cm. long, up to 0.25 cm. wide; rachis slender, subterete, up to 2.5 cm. long, minutely appressed pubescent; leaflets moderately inequilateral, oblong, up to 14.5 cm. long, up to 4.5 cm. wide, tapering obtusely, ultimately acuminate at apex, inequilateral to cordate at base, the costa densely pubescent, plane above, slender, about 0.2 mm. wide in middle, about 0.5 mm. wide proximally, the major secondary veins about 12, plane to seemingly immersed above, prominent beneath, strict proximally, arcuate near margin, the margin often obviously revolute; petiolules up to 0.3 cm. long. Panicles often exceeding uppermost leaves, the rachis slender, up to 35 cm. long, 0.1-0.2 cm. wide in middle, the branches numerous, the racemes cylindrical, about 1 cm. wide at base, the bracts not seen; bracteoles deciduous, subulate, up to 0.2 cm. long; pedicels slender up to 2 mm. long, about 0.3 mm. wide, puberulent. Receptacle-cup about 1 mm. long; sepals green to pale yellow in vivo, 0.8-1.5 mm. long, minutely pubescent on both sides, the margin villosulose; petals yellow in vivo, oblong to oblong-rotund, 1.1-3 mm. long, 0.6-1 mm. wide, minutely pubescent at base; filaments of stamens about 4 mm. long, pilose adaxially; anthers about 0.5 mm. long; stipe of ovary about 0.8 mm. long; ovary 1.4-1.8 mm. long, setose on sutures only, 7-ovulate; style about 1.7 mm. long. Legume narrow-elliptic to oblong, 10-20 cm. long, 1.5-2.5 cm. wide, obtuse at apex, cuneate at base, plane, glaucous, the exocarp often cracking.

BRITISH GUIANA: Moraballi Creek, Essequibo River: *Fanshawe* 3310 (K, US); *British Guiana Forest Dept.* F3394 (K,U).

SURINAM: Suhoza, Surinam River, *B.B.S.* 16 (U); Kaboerie, *B.W.* 4862 (U); Brownsberg, *B.W.* 2241 (U).

BRAZIL: AMAZONAS: Manáus, *Ducke 1219* (K, MO, NY).

S. micropetalum is readily recognized by a number of vegetative characters: the leaflets, occurring in 7–8 pairs, usually have a very revolute margin, the costa is plane above, and the secondary veins are strict and are not elevated on the upper surface. Its floral characters are even more sharply defined; the small oblong to oblong-rotund petals are not found in any other species of the genus, while the anthers are the smallest in the sclerolobiums.

Ducke is in error in describing the sepals of *S. micropetalum* as glabrous. While some sepals may be glabrous, the majority of dissected flowers shows pubescent sepals. Likewise, contrary to Ducke's description, the petals are minutely pubescent.

Unlike its ally, *S. macrophyllum*, the inflorescences are very numerous at the ends of the twigs, with the individual panicles being very lax and much branched.

The description of the fruit is based on *British Guiana Forest Dept. 3394*. No other species of *Sclerolobium*, except possible *S. guianense* and *S. paniculatum*, is known to have glaucescent fruit. The common name of *S. micropetalum* in Brazil is "Tachy Branco", and in British Guiana is "Yawarridan", a name also applied to *Tachigalia pubiflora* Benth., endemic to British Guiana. The field-notes on the pair of British Guiana collections are informative: "Calyx pale yellow; petals yellow—126 ft. high, 16 in. diam.", and "... buttressed to 6 ft in Licania forest. Fruit flat glaucous-green."

3. *SCLEROLOBIUM AUREUM* (Tul.) Benth. in Mart. Fl. Bras. 15²: 51. 1876.

Branchlets glabrous to puberulent. Leaflets 4–9—jugate. Leaves up to 45 cm. long; petioles terete, glabrous to puberulent, up to 6 cm. long; rachis slender, tapering toward apex, up to 30 cm. long, up to 0.15 cm. wide in middle, glabrous to densely puberulent; leaflets oblong, ovate to ovate-lanceolate, up to 11 cm. long, up to 4.2 cm. wide, vaguely acuminate, ultimately obtuse at apex, inequilateral or rarely subequilateral at base, the narrow side tapering obtusely, thin-coriaceous, reticulate above, the costa slender, about 0.1 mm. wide in middle, prominulous and pubescent above, prominent beneath, the principal secondary veins 7–12 per side, slender, prominulous, arcuate. Panicles occasionally exceeding upper-most leaves, pyramidal, up to 15 cm. long, the rachis slender, 0.1–0.2 cm. wide at base, densely or sparsely puberulent: the bracts deciduous; bracteoles deciduous; pedicels 1.5–3 mm. long. Receptacle-cup 1.2–3 mm. long; sepals 2.5–3 mm. long, puberulent on both sides, carnosose to petaloid, the margin villosulose; petals yellow, oblong to subrotund, 3–3.5 (4) mm. long, 2–4 mm. wide, glabrous except for a few scattered hairs at base; filaments up to 6 mm. long, hirsute, the hairs on inner side only; stipe of ovary 0.5–1 (1.4) mm. long; ovary 2–4 mm. long, hispid, the hairs usually more numerous on sutures, 7–10-ovulate; style 1.6–2.2 mm. long. Legume elliptic to rectangular-elliptic, 4–6.5 cm. long, up to 2.1 cm. wide, obtuse to acute, often cuneate at apex, cuneate at base, thin, smooth.

KEY TO THE VARIETIES

- Petals 3-4 mm. long; bracteoles deciduous.....3a. *S. aureum aureum*
 Petals 6-7 mm. long; bracteoles persistent.....3b. *S. aureum grandiflorum*

3a. *SCLEROLOBIUM AUREUM* var. *AUREUM*.

Tachigalia aurea Tul. in Arch. Mus. Nat. d'Hist. Nat. 4: 169. 1844 (T.: *Da Silva Manso in Martius Herb. 1148'*)

Sclerolobium aureum (Tul.) Benth. var. *velutinum*. in Mart. Fl. Bras. 15²: 51. 1876 (T.: *Riedel 463* or s.n.?)

Sclerolobium aureum (Tul.) Benth. var. *polyphyllum* Hassler, in Fedde Repert. Sp. Nov. 8: 131. 1910 (T.: *Rojas 10573'*).

BRAZIL: without specific locality: *Lhotsky* s.n. (B); *Herb. Richard* (P); *Martius Herb.* s.n. (B); *Martius Herb.* 264 (B); *Claussen* s.n. (F); *Glaziov 19056* (K); *Glaziov 12626* (B,K); MATO GROSSO: Rio Coxim, *Riedel 463* (K, probable holotype of *S. aureum* var. *velutinum*); BAIÁ: Marais d'Itabira, *Blanchet 3080* (K, NY, P, W); GOÍAS: without specific locality, *Burchell 7833* (K); *Glaziov 21023* (K, P); *Gardner 3117* (K, NY, W); Serra do Crystaes, S. Luzia, Meia Ponte, *Pohl 1026* (F, US, W) MINAS GERAËS: *Claussen?* 180 (K); *Claussen* 965 (NY); *Riedel 1339* (NY, US); *Glaziov 20285* (K); Cuiabá, *Da Silva Manso in Martius Herb. 1148* (B, F, photo & frag., NY, US); Lagoa Santa, *Warming* s.n. (F); Lagoa Santa, Santa Luzia, *Sampaio 6788* (F); Ituiutaba, *Macedo 1618* (MO); Porto Real, *Burchell 8605* (K); Uberava, *Regnell III-473* (K, US); Itajura, *Glaziov 12626* (NY); RIO DE JANEIRO: Cerra do Pirapora, *Burret, Brande & Barreto 10121* (F); SÃO PAULO: without specific locality, *Riedel* s.n.

PARAGUAY: Serra de Amambay, near Esperanza, *Rojas 10573* (K, MO, W); Esperanza, *Hassler 10731* (MO, US); Serra de Amambay, *Rojas 10731* (W); Rio Apa & Rio Aquidabán, *Fiebrig 4644* (K); Rio Apa, *Hassler 823* (W).

Tulasne (loc. cit.) described two "formae" of his *T. aurea* without applying a definite name to either one. The first, described as having leaflets "...tomentosis vel densius pubescentibus," is based on "Claussen col. 1 a, 1838 Cat. Herb. Bras. Mus. Par. no. 965, Bois n° 65" and on *Blanchet 3080*; the other form is described as having the petioles and petiolules ashen-pubescent with the pubescence "tenuissima vix conspicua." For this he cites "Mart. l.c." from Cuiaba (Minas Gerais) Brazil.

Benthams var. *velutinum* is probably equivalent to Tulasne's first form, although Benthams designates a Riedel collection as typical. Benthams variety is based essentially on one character, the density of the pubescence. A study of all of the material of the species indicates that the retention of this variety, considering the great variation in the density of the pubescence, is unwise.

S. aureum with its curved pedicels, obviously inequilateral cup, and broad petals, which usually exceed in width those of *S. macropetalum*, bears a striking resemblance in floral structure to the tachigalias. Its centrally located stipe, however, as well as the general habit of its inflorescence, readily distinguish it from this group. In *S. aureum* the leaflets are more reticulate above than perhaps in any other species, except *S. tinctorium*, *S. albiflorum*, and *S. pilgerianum*. The obtuseness of the apex of the leaflets is unique in the sclerolobiums and is a most useful character for quick identification of material. An outstanding

foilage character is the tapering basally in an obtuse fashion of the narrow side of the leaflet.

Apart from its large petals, the most outstanding floral character is the large number of ovules (7-10), apparently exceeding in number those of any other species of the genus, except possibly *S. paniculatum*.

The unnumbered sheet of Riedel at the Arnold Arboretum, is probably from the type collection; not only does the handwriting but also the locality cited, São Paulo, support this view. On the Pohl collection 1026, in Vienna, there is written "Serra do Chrystaes, S. Luzia, Megaponte." Unquestionably the more acceptable spellings of the first and third localities are Serra do Crystaes and Meia Ponte. I. Urban's itinerary of Pohl in Martius Flor. Bras. Historia, p. 79, indicates that the Serra do Cristaes referred to, is in Goias, as are S. Luzia and Meia Ponte. Apparently Pohl collected several sheets of *S. aureum* in these three different localities from Dec. 1918 to Jan. 1919.

Apparently the four collections cited above as being from Paraguay are the only ones of *Sclerolobium* from this country.

On Hassler 823 (W) two structures, which I presume to be bracts, were seen arising from the rachis of the mature panicle, one with two leaflet-like structures borne on a thin wiry rachis-like axis, the other with two pairs of leaflet-like structures¹⁰. I have not observed these in any other collections of the genus. Some of the leaflets of *Rojas 10731* have leaflets which are narrow-lanceolate. According to Tulasne the common name of *S. aureum* is "Sucupira". *Gardner 3117* bears the common name "Iatarena."

3b. *Sclerolobium aureum* var. *grandiflorum* Dwyer, var. nov. (T.: *Chaffanjon 217 P!*).

Foliola 4-5-juga apice acuminata; paniculae evidenter aureo-pubescentes; bracteolae persistentes; sepala 3-4 mm. longa; petala glabra, 6-7 mm. longa, circ. 4 mm. lata; filamenta staminum, 7-8 mm. longa; stylus circ. 3.5 mm. longus; fructus non visus.

VENEZUELA: Rio Orinoco, *Chaffanjon 217 P!*; APURE: Rio Arana, *Lasser 806 V!*.

The new variety is readily distinguished by its very large flowers with persistent bracteoles. The petals are apparently consistently glabrous and exceed by 2 to 3 mm. the length of the petals of *S. aureum* var. *aureum*. All the remaining floral parts of the new variety are larger.

The golden pubescence is striking, although it is found in other collections of the species. The Paraguayan collections of *S. aureum* var. *aureum* seem to resemble those of the new variety, although the floral parts are not as large and the bracteoles are not persistent.

SECTION II

4. *SCLEROLOBIUM ODORATISSIMUM* Spruce ex Benth. in Mart. Fl. Bras. 15²: 48. 1876 (T.: *Spruce 3057!*).

Branchlets puberulent. Leaflets 4-5-(6-) jugate. Leaves up to 40

¹⁰In both presumptive bracts the laminae are obtuse at the base and apex and are up to 1.8 cm. long; they have the same texture as the leaflets.

(?) cm. long; petioles up to 8 cm. long; myrmecodomatium fusiform, 3.5–5 cm. long, 0.5–0.8 cm. wide; rachis up to 14 cm. long, up to 0.25 cm. wide in middle, often with a portion of myrmecodomatium of petiole at base; leaflets narrow-elliptic to sub lanceolate, up to 16 cm. long, up to 7.5 cm. wide, acuminate, ultimately obtuse to subacute, inequilateral to subequilateral at base, shiny, coriaceous, glabrous to pubescent above, puberulent to appressed lanose beneath, the hairs golden, the costa plane to prominulous above, pubescent, the major secondary veins 10±, prominulous above and below, arcuate, the margin vaguely revolute. Petiolules up to 1.1 cm. long, slender to stout, up to 0.28 cm. wide. Panicles often exceeding uppermost leaves, the rachis 0.1–0.2 cm. wide in middle, densely puberulent, plane at base, the 2–3 (+ ?) branches, strongly divergent, slender, 0.1–0.15 cm. wide, up to 11.5 cm. wide, often rough with pedicel scars, the racemes narrow-pyramidal, up to 2 cm. wide at base, the bracts not seen; bracteoles deciduous; pedicels slender, 0.5–1.3 (2) mm. long, up to 0.6 mm. wide. Flowers in vivo white, yellow within. Receptacle-cup 1.3–3 mm. long; sepals 2–3 mm. long, sericeous on outside, villose at base, the hairs dense, subappressed, flaccid, the margin villose to villosulose; petals linear to linear-rectangular, 2.5–4 mm. long, 0.2–0.3 mm. wide, densely villose, the hairs strongly ascending, elongate, plumose; filaments linear, 3.7–6 mm. long, somewhat villose adaxially, the hairs elongate, flaccid; stipe of ovary 0.8–2 mm. long, ovary about 3 mm. long, 6–8-ovulate; style up to 3 mm. long. Legume oblong to elliptic, up to 5 cm. long, up to 2 cm. wide, acute to obtuse at apex, widely cuneate at base, plane, smooth, reticulate, the central veins several, longitudinally subparallel, obviously marginate, the margin 2–3 mm. wide.

KEY TO THE VARIETIES

- Leaflets typically narrow-elliptic to lanceolate, up to 16 cm. long; receptacle-
1.3–3 mm. long.....4a. *S. odoratissimum odoratissimum*
Leaflets typically oblong, 3.5–7 cm. long; receptacle-cup up to 1 mm. long
.....4b. *S. odoratissimum latifolium*

4a. *SCLEROLOBIUM ODORATISSIMUM* var. *ODORATISSIMUM*.

VENEZUELA: San José, Bajo Casiquiare, Rio Negro, *L. Williams* 16205 (V).

BRAZIL: AMAZONAS: Cucuí, Rio Negro, *Ducke* 35094 (U); San Carlos, Rio Negro, *Spruce* 3057 (B, F, photo and frag., K?, NY, P).

S. odoratissimum is one of the two species of the genus with a well-defined myrmecodomatium consistently present on the petiole. *Spruce* 3057, the type, bears an interesting note: "Flores flavi fragrantissimi Rio Negro secus San Carlos. Occupies place of *T. cavipes* on Uaupes." *Spruce* is referring to *Tachigalia cavipes* (*Spruce* ex Benth.) Macbr. which he collected on the Rio Uaupes at Panure in Amazonian Brazil (*Spruce* 2553, type collection of *T. paniculata* var. *cavipes*).

Pittier's description of *S. odoratissimum* in *Arbol y Arbust Del Orden De Las Leguminosas* (II *Caesalpiaceas* 135. 1928) suggests that he collected the same on the Rio Negro (Venezuela).

- 4b. *Sclerolobium odoratissimum* var. *latifolium* Dwyer, var. nov. (T.: *Krukoff* 8988, MO!).

Foliola oblonga, 3.5–7 cm. lata, infra aureo-sericea comis minutis creberrimis; petioluli 0.7–1 cm. longi; hypanthium ad 1 mm. longum.

BRAZIL: AMAZONAS: São Paulo de Olivença, basin of Creek Belém, *Krukoff* 8988 (F, K, MO, US).

The new variety is distinguished by obviously wider leaflets which appear to be consistently golden pubescent on the under surface. Despite the fact that the mature flowers were not available for dissection, nevertheless several striking floral differences are evident: longer pedicels, a shorter receptacle-cup, and less densely pubescent filaments of the stamens.

5. *SCLEROLOBIUM ALBIFLORUM* Benoist, in Bull. Bot. Soc. France 63: 383. 1920 (Syntypes: *Benoist* 1074).

Branchlets puberulent. Leaflets 3–4 (rarely 5–) jugate. Leaves rarely imparipinnate, up to 65 cm. long; petioles up to 20 cm. long, glabrous to puberulent; rachis terete to angular, up to 40 cm. long, 0.2–0.5 cm. wide, minutely ferrugineous-puberulent; stipules apparently of 2 segments (here immature) short-stipitate, the blades markedly involute, the larger up to 1.2 cm. long; leaflets inequilateral, elliptic to oblong, curved subfalcately, up to 26 cm. long, up to 10.5 cm. wide, acuminate, the acumen often up to 2 cm. long, inequilateral-subcuneate to obviously obtuse at base, thin-coriaceous, glabrous to minutely pubescent, the hairs often confined to veins, the costa subplane to prominulous above, up to 1.2 mm. wide proximally, the major secondary veins 6–7, slender, prominulous above and below, arcuate; petiolules wiry to tumescent, 0.5 cm. wide, densely puberulent. Panicles dense, shorter than leaves, the rachis about 0.4 cm. wide puberulent, the branches numerous, upright, stiff, puberulent, up to 6 cm. long, the racemes about 1 cm. wide at base, bracts not seen; bracteoles linear subulate, up to 6 cm. long, puberulent; pedicels 0.8–2 mm. long. Receptacle-cup inequilateral; sepals oblong, 2.3–2.7 mm. (4 mm. fide Benoist) long, puberulent on both sides, cariose, the margin involute, petals white, linear to linear-subulate, up to 3 mm. long (including hairs), up to 0.2 mm. wide (not including hairs), villose, the hairs ferrugineous, dense filaments of stamens linear-subulate, 2.5–3.5 mm. long, villose on lower half, the hairs dense, ferrugineous, deflexed at base; anthers about 0.8 mm. long; stipe of ovary about 1 mm. long; ovary about 2 mm. long, 0.5–0.7 mm. wide, the hairs spike-like, ferrugineous, up to 0.7 mm. long, dense on sutures, scattered over valves, about 6-ovulate; style subulate. Fruit not seen.

FRENCH GUIANA: Charvein, *Benoist* 232 (P); St. Jean, *Benoist* 1074 (P).

SURINAM: Zanderij, *B. W.* 6198 (MO, U), *B. W.* 6235 (U); Sectie O: *B. W.* 1160 (U), *B. W.* 2343 (U); Coppename River, near Raleighfalls, *Stahel* 6274 (U); Nassau Falls, *Lanjouw & Lindeman* 2859 (U); Nassau Mts., Hellingbos, *Lanjouw & Lindeman* 2539 (U).

S. albiflorum appears to be closely related to *S. amplifolium* of

Amazonian Brazil; however it has more numerous leaflets which are obviously more reticulate on the upper surface and have fewer and more arcuate-ascending veins; the latter are likewise more prominulous beneath. Both species show a marked reduction in width of the most terminal portion of the rachis of the leaves; this bears a pair of terminal leaflets considerably reduced in size. The linear and densely flaccid-villose petals, the tufted hairs of the filaments, and the spike-like hairs of the ovary suggest *S. amplifolium*.

Amshoff's remark (loc. cit.) that the leaflets are glabrous is open to question inasmuch as I found, on close examination, that all collections of the species have some leaflets which are pubescent at the base.

Benoist 232 and *1074* have solitary, small and round tumescences on several leaflets; these are likewise scattered on petioles, petiolules, and the rachis of the leaves. Apparently these are galls, bearing no resemblance to myrmecodomatia as found in some sclerolobiums.

The only flowering material I have seen is the syntype, *Benoist 1074*. Its inflorescence is markedly compressed with the branches of the panicles upright and flabellate. Exteriorly, individual flowers have two striking features: the inequilateral receptacle-cup, and the stiff and upright sepals with inrolled margins.

Common names of *S. albiflorum* in Surinam are: "Roode Djedoe", "Mattawari ninge djedoe", "Jawaredan Belero", and "Tamoene Araurama".

6. *SCLEROLOBIUM AMPLIFOLIUM* Ducke, in Arch. Inst. Biol. Veg. Rio de Janeiro 2: 43. 1935 (T.: *Ducke 24295*).

Branchlets minutely pubescent. Leaflets 5-7-jugate, up to 40 cm. long; petioles up to 5.5 cm. long, puberulent, with or without a myrmecodomatium; rachis up to 26 cm. long, up to 0.3 cm. wide in middle, tapering distally; stipules up to 4 cm. long, of two segments, oblong to rotund, up to 3 cm. long; leaflets obviously inequilateral, oblong, up to 18 cm. long, up to 8 cm. wide, tapering into a short and obvious acumen, ultimately obtuse at base, the wider side joining costa about 0.5 cm. below junction of narrow side, thin-coriaceous, the reticulate areas honey-comb-like (under mag.) the costa prominulous above, plane beneath, pubescent, the principal secondary veins about 10 per side, arcuate, sharply-ascending, stout and prominent beneath, the margin scarcely differentiated; petiolules up to 0.9 cm. long, pubescent. Panicles up to 20 cm. long, the rachis obviously canaliculate, subulate, up to 0.45 cm. wide at base, smooth, densely puberulent, the branches numerous, the lowermost apparently soon deciduous, up to 8.5 cm. long, up to 1.5 cm. wide at base; bracts deciduous; bracteoles subulate, up to 0.2 cm. long; pedicels up to 0.5 mm. long. Receptacle cup bowl-shaped, about 2.3 mm. long, up to 3 mm. wide, almost as wide at base as above; sepals 3-4 mm. long, lanate on both sides, the margin densely villose; petals linear, about 4 mm. long, 0.07-0.1 mm. wide (excluding hairs), the hairs dense, plumose; filaments about 5 mm. long, densely tufted-villose below middle on adaxial surface; anthers about 1 mm. long; stipe of ovary about 0.6 mm. long, stout, about 0.3 mm. wide in middle; ovary narrow-oblong, 2-3 mm. long, densely, hirsute all over,

the hairs stiff, ferrugineous, up to 0.7 mm. long, 5–6-ovulate; style about 2.5 mm. long. Fruit not seen.

BRAZIL: AMAZONAS: São Paulo de Olivença, Rio Solimoes, *Ducke* 24295 (F, frag., K, P, U, US); São Paulo de Olivença, *Krukoff* 8879 (F, K, MO, US).

S. amplifolium, known only from the general type locality, is marked by very large leaflets which, under magnification, have a honey-comb appearance on the upper surface and have a costa which is not prominent beneath. The rachis of the inflorescence appears subulate, a condition correlated with its canaliculate nature. An additional distinguishing character is the widely bowl-shaped receptacle-cup bearing very large sepals. It is obviously closely related to the Guianese species, *S. albi-florum* (cf. my discussion p. 83).

Krukoff 8879 in Kew has the petiole bearing a myrmecodomatium; sheets of this collection in other herbaria do not have this.

Harms in describing *Sclerolobium herthae* (in Notizbl. Bot. Berlin 15: 46. 1940) relates it to *S. amplifolium* and *S. eriopetalum*.¹¹

7. SCLEROLOBIUM HYPOLEUCUM Benth. in Hook. Jour. Bot. 2: 236. 1850 (T.: *Riedel* s. n.).

Branchlets smooth. Leaflets 2–4 jugate. Leaves up to 16 cm. long; petioles slender, up to 3 cm. long, glabrous; rachis slender, 2.5–3.5 cm. long, about 0.07 cm. wide in middle; stipules up to 1.5 cm. long, of one or two ovate-rotund segments, about 1 cm long, short-stipitate; leaflets subequilateral, ovate to ovate-elliptic, up to 7 cm. long, up to 3 cm. wide, acuminate, ultimately obtuse at apex, obtuse and scarcely inequilateral at base, coriaceous, smooth or subrugose above, cream-colored beneath (when pubescence persistent), glabrous above except for costa, lanose beneath, the hairs minute appressed, the costa slender, about 0.5 mm. wide proximally, scarcely prominulous above, the major secondary veins about 6, slender, evanescent, subimmersed above, prominulous; petiolules up to 0.4 cm. long, pubescent. Panicles or occasionally solitary axillary racemes, up to 17 cm. long, very lax, the rachis terete or subangular at base, up to 0.2 cm. wide at base, densely puberulent, the branches up to 11 cm. long, the racemes tapering,

¹¹Prof. E. Werdermann of the Botanischer Garten und Museum, Berlin, informs me that the type of *S. herthae* Harms (*Hertha Schultze Rhonhof* 2922) from Mera, Pastaza, Orienta, Ecuador, was destroyed during the bombing of Berlin in World War II. Apparently there is no isotype in existence. *S. herthae* is the only species of the genus known from Ecuador. There is little doubt from Harms' description that it belongs in section *Eusclerolobium*. He related it to *S. amplifolium* and *S. leiocalyx*. Unfortunately his discussion of relationships is very brief. Macbride (loc. cit.) who apparently did not see the holotype, comments on the species in his discussion of *S. setiferum*, adding little to Harm's original statements. The latter's description of the leaflets as "papyracea vel chartacea" and the stipules as "magnae" is very interesting. The former character was noted only in three species: *S. paniculatum* var. *paniculatum*, *S. tinctorium*, and *S. melinonii*. The fact that *S. herthae* has stipules which are non-pectinate argues against a close relationship with this trio of species. The linear petals with very dense and elongate hairs suggest a possible relationship with *S. setiferum*, *S. eriopetalum*, and *S. leiocalyx*. I have observed stipules only in the first species; these may be considered as large.

1.5–2 cm. wide at base, the bracts not seen; bracteoles not seen; sepals 2–3.3 mm. long, villosulose on outside, weakly lanate to subglabrous within, the margin densely villose; petals yellow, linear, 2–3.3 mm. long, up to 0.1 mm. wide, the hairs elongate, twisted, plumose, often sub-tufted at apex; filaments up to 7.5 mm. long, villose, the hairs yellow, flaccid, somewhat dense; stipe of ovary about 2 mm. long, ovary about 2 mm. long, hirsute or subhirsute, the hairs often more dense on sutures, often tufted or scattered on valves, about 5-ovulate; style about 2 mm. long. Legume rotund, 3.5–4.5 cm. long, up to 2.5 cm. wide, tapering cuneately, ultimately obtuse, cuneate at base, smooth, the exocarp with obvious fissures.

BRAZIL: AMAZONAS: Manáus, Igarapé da Cachoeira Grande, *Ducke* 523 (A, F, K, MO, NY); *Ducke* 1226 (K, MO, NY, US); *Ducke* 35092 (K, P, US); Barcellos, Rio Negro, *Ducke* 7166^b (US); Rio Apuaú, lower Rio Negro, *Ducke* 23326 (US); PARA: without specific locality, *Riedel* 540 (K); Barra, Rio Negro, *Spruce* 1449 (K), *Spruce* 1650 (F, frag. & photo, K, P, MO, NY, US, photo); RIO DE JANEIRO: without specific locality, *Glaziov* 13670 (K).

S. hypoleucum, a species of wide distribution, although known only from a few Brazilian collections, possesses an array of distinguishing characters unmatched by any other species of section *Eusclerolobium*. Its leaflets are unique in being consistently ovate to ovate-elliptic. The reduction of leaflet pairs to 2, 3 or 4, coupled with the broad racemes, permit ready identification. No other species of the genus has racemes exceeding 2 cm. in width at the base. The occasionally glabrous sepals (inner surface only), plumose petals, elongate filaments, long-stipitate ovary, and subrotund fruit resembling a flattened plum (cf. *Spruce* 1449), are supplementary features of a critical nature.

The type of *S. hypoleucum* was designated by Bentham as an unnumbered collection of Riedel from the "Woody hills of Barra do Rio Negro". In Kew there is a sheet of *S. hypoleucum* labelled "Barra," and "Riedel 540." It is questionable whether this is the type. Bentham in his second description of the species (Mart. Fl. Bras.) cites 3 collections: the 2 Spruce collections cited above and an unnumbered Riedel collection from . . . "Manaos, prov. do Alto Amazonas."

Spruce 1650 (K) bears an interesting note: "Fls. very odoriferous (like those of a *Connarus*). Cal. white-corolla and fil. yellow-orange." The leaflets of most collections appear to be attacked by a specific fungus. The species is common in the "igapo".

Glaziov's collection of *S. hypoleucum* in Rio de Janeiro is of interest. The only other species of section *Eusclerolobium* known from this area are: *S. pilgerianum*, *S. chrysophyllum*, *S. paniculatum*, and possibly *S. striatum*.

8. *SCLEROLOBIUM MELANOCARPUM* Ducke in Arch. Inst. Biol. Veg. Rio de Janeiro 2: 43. 1935.

Branchlets glabrous, cracking transversely. Leaflets 3–5-jugate. Leaves up to 19 cm. long; petioles 1.5–3 cm. long smooth, minutely pubescent; rachis wiry, slender, up to 10 cm. long, about 0.13 cm. wide;

leaflets elliptic to obovate, often curved subfalcately, up to 9 cm. long, up to 3.5 cm. wide, scarcely acuminate, the acumen obtuse, subacute and inequilateral at base, thin-coriaceous, glabrous except on veins, the costa prominent above at least proximally, minutely pubescent, the major secondary veins ≈ 6 arcuate-ascending the margin scarcely revolute; petiolules 0.2–0.3 cm. long, minutely pubescent. Panicles shorter than uppermost leaves, lax, the rachis often twisted, up to 13 cm. long, about 0.13 cm. wide at base, slender, unbranched for 1–4 cm. of length, the branches divergent, up to 6 cm. long, about 0.1 cm. wide in middle, the racemes about 1 cm. wide at base, the bracts with stalk about 0.2 cm. long, with blades about 0.2 cm. long, obviously revolute; bracteoles subulate; pedicels about 0.5 cm. long. Receptacle-cup up to 2 mm. long; sepals 1.8–3 mm. long, sericeous on both sides, the hairs on inner surface somewhat longer, villosulose on margins; petals linear to linear-subulate, 2–2.5 mm. long, up to 1.3 mm. wide (including hairs), villose, the hairs golden, densely plumose, often deciduous; filaments of stamens subulate, ≈ 3.2 mm. long, villose, the hairs dense, bushy, deciduous; stipe of ovary about 1 mm. long; ovary about 2 mm. long, densely hirsute all around, the hairs ferrugineous, spreading 3–6-ovulate. Fruit not seen but (fide Ducke) oblong, up to 12.5 cm. long, up to 3.4 cm. wide.

BRAZIL: AMAZONAS: Manaus beyond Flores, *Ducke* 858 (F, K, MO, NY); Borba, Rio Madeiras, *Ducke* 23330 (F., frag. K, P, U).

S. melanocarpum is distinguished by its subequilateral leaflets with their few major secondary veins. Other diagnostic characters of importance are: the slender rachises of the leaves and inflorescences, and the short stamens and petals. Unfortunately I have not seen the two syntypes (*Ducke* 23339 and 16429) collected by Ducke, one at Borba, Amazonas, and the other at Tapajoz, in Pará.

9. *Sclerolobium striatum* Dwyer, spec. nov. (T.: *Pessal* s.n. MO!)

Arbores magnae. Ramuli granuloso-pubescentes. Foliola 4–6-juga. Folia ad 23 cm. longa; petioli ad 4.5 cm. longi, sericei; stipulae non visae; foliola inaequilateralia elliptica, ad 10.5 cm. longa, ad 3.3 cm. lata, apice acuminata acumine saepe falcato, basi inaequilateralia angusto latere costam circ. 3 mm. supra latum latus jungente, tenui-coriacea saepe supra favo subsimilia evidenter glabra praeter costam et aliquas venas infra, costa supra plana infra prominente basi circ. 0.1 mm. lata, venis secundariis circ. 15, gracilissimis supra planis infra prominulis strictis denique arcuate ad margines dispositis, marginibus vix irregularibus; petioluli ad 0.7 cm. longi, saepe contorti. Paniculae compressae ad 11 cm. longae, circ. 0.35 cm. latis, plerumque crassiores proxime ortus ramulorum, dense ferrugineo-puberulis canaliculatis, bracteis non visis; bracteolae subulatae mox deciduae; pedicelli ad 0.8 cm. longi. Gemmae obpyriformi-subrotundatae; hypanthium 1–1.4 mm. longum; sepala ad 3.3 mm. longa, extus sericea intus appressolana, marginibus dense villosulis; petala subulata, circ. 2 mm. longa, circ. 0.2 mm. lata, dense villosa comis terminalibus quam plumula dispositis; filamenta subulata infra medium pubescentia comis crebris periplicatis elongatis; stipes ovarii ad 0.6 mm. longus; ovarium

rectangulari-oblongum, ad 2.7 mm. longum, 7–8-ovulatum. Fructus non visus.

BRAZIL: RIO DE JANEIRO: Botanical Garden, Rio de Janeiro, *Pessal* s. n. (*Herb. no. 61518*) (MO).

The new species is marked by several foliage characters: the narrow and numerous leaflets borne on twisted petiolules, the plane costa, as well as the numerous and proximally strict veins. Distinguishing floral characters are: the short subulate petals with hairs dense and flabellately disposed and the coriaceous ovary which is occasionally sessile. Each valve of the ovary, due to the uneven distribution of the hairs, has 2 somewhat vague longitudinal striae. This striate condition, from which the species derives its name, is known in another species of the genus, *S. pilgerianum*, also described from Rio de Janeiro.¹²

While the plane costa and secondary veins suggest that the new species may belong to section *Oriens*, the pedicellate flowers and densely pubescent petals are far more suggestive of section *Eusclerolobium*.

10. *SCLEROLOBIUM MACROPHYLLUM* Vogel in *Linnaea* 11: 396. 1837.

Branchlets smooth, canaliculate, apparently glabrous. Leaflets (5) 6–9-jugate. Leaves up to 50 cm. long; petioles smooth, glabrous, subterete, 4–9 cm. long, 0.3–0.4 cm. wide in middle; stipules not seen; leaflets somewhat inequilateral, oblong-lanceolate or ovate-lanceolate 6–14 cm. long, 3–4 cm. wide, acuminate at apex, the acumen up to 1.5 cm. long, ultimately obtuse, obtuse on wider side at base, thin-coriaceous above, glabrous to obviously scattered-puberulent, the costa slender, prominulous above, somewhat prominent beneath, up to 0.7 mm. wide, the major secondary veins 8–12, prominulous above, somewhat more prominulous beneath, slender, about 0.1 cm. wide above; petiolules up to 0.6 cm. long, glabrous, marcescent. Panicles obviously lax, the rachis smooth, canaliculate, curved, up to 25 cm. long, up to 0.6 cm. wide at base, puberulent, the branches lax, usually simple, the racemes narrow-cylindrical, up to 1.2 cm. wide at base, the bracts not seen; bracteoles not seen; pedicels 0.3–0.6 mm. long. Receptacle-cup about 1.3 mm. long; sepals about 3.2 mm. long, puberulent on both sides, the margin villosulose, petals linear, 3–4 mm. long, about 0.1 mm. wide (not including hairs), the hairs golden, moderately dense, about 0.7 mm. wide; filaments 5–6 mm. long, spreading rotately, villose, the hairs golden, somewhat bushy; stipe of ovary 0.8–1 mm. long; ovary about 2 mm. long, villose all around, the hairs dense, somewhat stiff, golden, 6-ovulate; style about 1.2 mm. long. Legume (fide Vogel) immature, elliptic-oblong, about 4 cm. long, subobtuse at apex, plane, glabrous, green.

BRAZIL: MINAS GERAËS: Rio Piracicaba ?, Itajurú, *St. Hilaire B. 597* (F, P).

Unfortunately I have not seen the type material of *S. macrophyllum*

¹²In my monograph of *Tachigalia* (loc. cit.) I found one species of the 22 discussed, having an ovary with the hairs in longitudinal rows: *T. versicolor* Standley & Williams, from Costa Rica; this is the only extra-South American species of the genus.

(*Manso & Lhotsky* s. n. from Cuiabá, Mato Grosso) which is apparently sterile. St. Hilaire's collection, cited above, appears to agree with the original description of Vogel.¹³ There is a good possibility too, that St. Hilaire himself may have compared his own collection with the actual type. Bentham (loc. cit.) apparently had access to the type material of *S. macrophyllum*, citing it as a synonym of *S. paniculatum*. We note however, in Vogel's original description, that the pedicels are described as "brevissimi"; very short pedicels do not suggest *S. paniculatum*; the pedicels of this species are the longest found in section *Eusclerolobium*. Admittedly however, Vogel probably had few specimens of *Sclerolobium* on hand for comparative study.

11. SCLEROLOBIUM PHYSOPHORUM Huber, in Bol. Mus. Goeldi 6: 80. 1909.

Branchlets golden-puberulent. Leaflets 5-8-jugate. Leaves up to 40 cm. long; petioles 2.5-3 cm. long, the hairs ferrugineous; myrmecodomatium fusiform, about as long as petiole, up to 0.7 cm. wide; rachis up to 25 cm. long, slender, up to 0.25 cm. wide in middle; stipules apparently of one segment, oblong-rotund, up to 2.5 cm. long, up to 2 cm. wide, scarcely stipitate; leaflets inequilateral, oblong to narrow-oblong, up to 14 cm. long, up to 4.5 cm. wide, obviously acuminate, the acumen up to 1.2 cm. long, inequilateral-cordate at base, thin-coriaceous, reticulate, minutely granulose (under mag.) beneath, with scattered lax hairs above and below, the hairs up to 0.4 mm. long, the costa plane above, prominulous beneath, the major secondary veins in larger leaflets about 9, slender, arcuate-ascending; petiolules up to 0.4 cm. long, ferrugineous. Panicles compressed, scarcely exceeding uppermost leaves, the bracts often persistent, of 2 segments, up to 1.5 cm. long, up to 1 cm. wide; bracteoles deciduous, carinate, up to 5 mm. long, densely pubescent; pedicels of flowers up to 0.7 mm. long. Receptacle-cup up to 2 mm. long; sepals 2.7-3 mm. long, thin, with the veins evident, densely villosulose on outside, the hairs within minute, often confined to base, the margin densely villosulose; petals linear to subulate, 3-5 mm. long, glabrous; filaments of stamens linear-subulate, up to 5 mm. long, the hairs sulphur-yellow, elongate, moderately dense, flaccid, fewer on abaxial side; stipe of ovary about 0.8 mm. long; ovary about 2 mm. long, hirsute all around, 5-6 ovulate; style 2-2.5 mm. long. Fruit not seen.

BRAZIL: AMAZONAS: Lago Massaurá near Maués, *Ducke* 20342 (K, P, U).

This species can be readily identified from a pair of leaf characters: the 5-8 pairs of leaflets and the well-defined myrmecodomatia, occupying most of the length of the petiole. Less obvious characters are the boat-shaped bracteoles, the relatively thin sepals, the elongate and glabrous petals, and the short anthers.

¹³The St. Hilaire collection in Field Museum is labelled "Rio de Janeiro" (not in St. Hilaire's hand). From his hand-written field-notes deposited in Paris one would suspect that the place of collection is Itajurá in Minas Geraes, and not Rio de Janeiro. In these notes the locality "Piracicaba", or probably a misspelling of the same by St. Hilaire, is almost illegible.

Macbride (in Publ. Field Mus. 13, part 3¹: 1943) states that the petals are up to 3 mm. long; I have found some up to 5 mm. in length.

While Huber, in his description of the type, and Macbride (loc. cit.), refer to the petioles as inflated, it is much more desirable to designate the inflations as myrmecodomatia. Many species have occasional collections with poorly defined inflations.

Apparently *S. physophorum* is a common species, being found according to Ducke at "Lago Puraquequara abaixo da boca do Rio Negro; baixo Japurá, lugar Jubará." I did not see the type *Ducke 6751*.

12. *SCLEROLOBIUM GOELDIANUM* Huber in Biol. Mus. Goeldi 6: 78. 1910.

Branchlets puberulent. Leaflets 3–4 jugate. Leaves up to 31 cm. long; petioles 5–6 cm. long, terete, puberulent; stipules not seen; leaflets subequilateral to equilateral, elliptic to ovate-elliptic, up to 14 cm. long, up to 4 cm. wide, obviously attenuate-acuminate, the acumens up to 1.5 cm. long, usually curved and ultimately acute, obtuse and scarcely inequilateral at base, coriaceous, smooth above, golden-sericeous beneath, apparently glabrous above except near petiolule, the costa immersed above, about 1.1 mm. wide proximally, densely pubescent, the secondary veins about 15 per side, evanescent or visible and immersed above, prominulous beneath, strict near costa, curving sharply near margin, the margin revolute; petiolules up to 0.7 cm. long. Panicles up to 20 cm. long, the rachis subterete at base, up to 0.35 cm. wide, puberulent, the hairs appressed, ferrugineous, the inferior branches simple for 2–5 cm., the superior with branchlets often several arising from one point, the rachis of branchlets 0.5–1 mm. wide, the racemes narrow-pyramidal, about 1 cm. wide at base, the bracts deciduous, subulate, here up to 1.2 cm. long; bracteoles persistent, subulate up to 0.7 cm. long, at least twice the length of the terminal buds; pedicels short. Receptacle-cup about 1.3 mm. long; sepals 1.2–2.5 mm. long, minutely puberulent on both sides, the margin villosulose; petals yellow, linear to club-shaped, up to 3.5 mm. long; up to 0.5 (0.7) mm. wide at apex, glabrous or villose, the hairs scattered at apex; filaments up to 6 mm. long, some obviously crassate, villose, the hairs often rather dense; stipe of ovary about 1 mm. long; ovary up to 1–5 mm. long, completely covered with hairs; style up to 2.5 mm. long. Legume oblong, strongly compressed (fide Huber).

BRAZIL: AMAZONAS: Rio Negro, Enuixy, Japura, *Froes 22366* (NY, V); Rio Negro, Acajutuba, *Ducke 682* (F, MO, NY).

S. goeldianum, is readily recognized by its elliptic to ovate-elliptic leaflets which are golden-sericeous beneath and apparently are almost completely devoid of hairs on the upper surface; the margin of the leaflets appears more consistently revolute than in the other sclerolobiums. The persistent subulate bracteoles permit ready identification of the species. Outstanding floral characters are: the occasionally clavate petals, the slender and subplane filaments of the stamens, the small ovary (perhaps the smallest in the genus), and the elongate style. Clavate petals are rare among the species of section *Eusclerolobium*;

they are, however, found in *S. bracteosum*, reflecting its close alliance with *S. goeldianum*.

Ducke (in Bol. Técn. Instituto Agron. do Norte 18: 132. 1949) indicates that *S. goeldianum* has been collected frequently, although I have seen only two of his numbers.¹⁴ The common names of *S. goeldianum* are "Tachi" and "tachizeiro".

13. SCLEROLOBIUM BRACTEOSUM Harms, in Verhandl. Bot. Ver. Brandenb. 48: 168. 1907 (T.: *Ule 6094* !).

Branchlets somewhat canaliculate. Leaflets 5-jugate. Leaves up to 40 cm. long; petioles up to 13 cm. long, the rachis up to 17 cm. long, about 0.2 cm. wide in middle; stipules not seen; leaflets widely oblong, up to 18 cm. long, up to 10 cm. wide, tapering obtusely at apex, ultimately short-acuminate, scarcely inequilateral and subcordate at base, thin-coriaceous, minutely appressed-pubescent above, densely pubescent beneath, some hairs short, others longer and ferrugineous, the costa slender, about 0.3 mm. wide in middle on upper surface, scarcely prominulous above, the principal secondary veins 10-15, plane to sub-immersed above, prominent beneath, strict near costa, arcuate toward margin; petiolules up to 0.5 cm. long, pubescent. Panicles not exceeding uppermost leaves, the rachis up to 0.5 cm. wide at base, pubescent, the hairs dense, ferrugineous, the racemes narrow-cylindrical, up to 1 cm. wide at base, bracts not seen; bracteoles subulate, up to 0.7 cm. long, at least twice the length of the most terminal buds. Flowers sessile; receptacle-cup about 1.5 mm. long; sepals up to 2.8 mm. long, glabrous to densely hirsute within, the hairs ferrugineous, the margin villosulose; petals linear, narrow-rectangular to subclavate, 2.2-3.2 mm. long, up to 0.4 mm. wide, glabrous; filaments of stamens subulate, up to 3 mm. long, villose below middle, the hairs dense, flaccid; anthers about 0.3 mm. long; stipe of ovary about 0.3 mm. long; ovary up to 2 mm. long, densely villose, the hairs ferrugineous; style apparently much shorter than pistil. Legume elliptic to oblong, up to 6.5 cm. long, up to 2.3 cm. wide, obtuse at apex, cuneate at base, smooth, monospermate.

BRAZIL: AMAZONAS: Rio Marmelos & Rio Madeira, *Ule 6094* (F., frag., K, Mo, photo., US, photo); PARÁ: Conc. dos Araguaia, *Macedo 4063* (MO).

The elongate and apparently persistent bracteoles of *S. bracteosum* suggest immediately that it is related to *S. goeldianum*. The fact that the leaflets of both species are subequilateral with the secondary veins immersed or subimmersed above is additional indication of this alliance. The presence of glabrous petals in both species (although some may be villose in *S. goeldianum*) is likewise suggestive of the *S. paniculatum*,

¹⁴Ducke & Black in their Phytogeographical Notes on the Brazilian Amazon (in Dos Anais de Academia Brasileira de Ciências 25¹: 32. 1953) make the following statement: "Several species (of trees) have been observed in the Middle or Western part of the hylaea (of the Brazilian Amazon) and also in the Amazonian estuary, but not in the intermediate country: . . . *Macrolobium Huberianum* and *Sclerolobium Goeldianum* on the Trombetas and Rio Negro, respectively, and both together on the Rio Capim (near Belem)." On *Ducke 682* is written "igapo": this is the perpetually wet lowland (varzea) of the hylaea.

S. tinctorium etc. complex, whose taxa are marked by pectinate stipules. Unfortunately I have not seen the stipules of *S. bracteosum* and *S. goeldianum*.

The leaflets of *S. bracteosum*, although ultimately short-acuminate at the apex, taper only slightly and are distinctly obtuse.

14. *SCLEROLOBIUM PANICULATUM* Vogel, in *Linnaea* 11: 397. 1837
(T.: *da Silva Manso & Lhotsky* s. n. !).

Branchlets smooth, velutinous. Leaflets 4-7-jugate, rarely disposed as 2-3 pairs; petioles 1.5-4 mm. wide, squarrose to subterete, velutinous to scattered-puberulent; leaflets oblong to ovate-oblong, 7-13 cm. long, up to 6 cm. wide, obviously acuminate, the wide side obtuse to subcordate at base, thin-coriaceous, reticulate, smooth, scattered-puberulent above, usually golden-puberulent below, the costa plane to prominulous above, often densely pubescent, the principal secondary veins 6-12, somewhat arcuate; petiolules short. Rachis of panicle slender, often flexuous, densely puberulent, the racemes 1-1.5 cm. wide at base, the bracts not seen; bracteoles not seen; pedicels 1.6-3 mm. long. Receptacle-cup up to 1.5 mm. long; sepals 2.7-3.2 mm. long, sericeous on exterior, scattered-pubescent to glabrous within, the marginal hairs short or elongate; petals linear to subclavate, 2-3.5 mm. long, up to 0.2 mm. wide, entirely glabrous or with very few flaccid hairs; filaments of stamens 3-4 mm. long, densely villose; anthers about 1 mm. long; stipe of ovary 0.5-1 mm. long; ovary 2-2.7 mm. long, villose, the hairs flaccid and extending over entire surface, 4-9-ovulate; style 1.2-2.7 mm. long. Mature fruit not seen.

KEY TO VARIETIES

- Leaflets coriaceous, smooth, not reticulate above, the intervenal areas scarcely visible.....14b *S. paniculatum subvelutinum*
Leaflets submembranaceous to coriaceous, reticulate above, the intervenal areas obvious above.
 Leaflets submembranaceous.....14a *S. paniculatum paniculatum*
 Leaflets coriaceous
 Leaflets ferrugineous-pubescent beneath; Brazil.....
 14c. *S. paniculatum rubiginosum*
 Leaflets sericeous-pubescent beneath; Peru.....
 14d. *S. paniculatum peruvianum*

14a. *SCLEROBLOBIUM PANICULATUM* var. *PANICULATUM*.

BRAZIL: without specific locality, *da Silva Manso & Lhotsky* 77? (MO); AMAZONAS: Manáus, Ponta Negra, *Ducke* 655 (F, MO); PARÁ: Tapajóz: Aramanahy, *da Costa* 227 (US); Belterra, Rio Tapajoz, Pindobal, *Black* 27-X-947 (NY, U, V); Arnarau, Santarém, *Kuhlmann* 17811 (U); Monte Alegre, *Ducke* 17026 (U); Faro, *Ducke* 10974 (U); Serra de Parintins, Amazonas-Para border, *Ducke* 20344 (U).

The length of the pedicels of *S. paniculatum* serves to distinguish it from all the other species of *Sclerolobium*. Var. *paniculatum* is characterized by having its leaflets submembranaceous. In addition the blades have very few hairs above, often approaching the subglabrous condition. The surface is markedly reticulate above. The panicles are more lax than in the other varieties, while the petiolules and rachis of the leaves tend to be more slender.

There is a possibility that the Manso & Lhotsky collection in the Missouri Botanical Garden is a type collection, despite the fact that it bears a number 77 on the label. It appears to match Vogel's type description closely.

The fruit of var. *paniculatum*, as found in the immature state on *Kuhlmann 17811*, is oblong to subrhomboidal in shape, here measuring 3.5 cm. in length, and 0.8 cm. in width. Bentham, in describing *S. paniculatum*, states that the immature fruit is glaucescent.

14b. SCLEROLOBIUM PANICULATUM var. SUBVELUTINUM.

BRAZIL: without specific locality: *Herb. Vindob 5* (?); 88 (W); *Burchell 793 A* (NY, P); *Glazion 21025* (B); BAHIA: Agreste do Rio das Femeas, *Luetzelburg 610* (NY); Sitio do Pará, *St. Hilaire C₁ 866* (F, P); Santa Luzia & Rio Vermelho, *Glazion 21024* (K, NY); MATO GROSSO: Cuiabá, *Damazio s. n.* (R); Santa Anna da Chapada, *Malme 2382* (F); Serra de Chapada, *Riedel 1150* (NY); MINAS GERAËS: Curvello, *Lund 38911* (NY); Carmo, Rio Paran , at Rio Tocantins & Rio Preto, *Pohl 2302* (W), *Pohl 2342* (F, US); SAO PAULO: Sao Marcos, *Riedel & Lund 2522* (NY). MARANH O: Carolina, *Macedo 4033* (MO).

PERU: LORETO: Tarapoto, *Spruce 4942* (B, F, NY, W).

This variety is readily distinguished by the silvery or golden pubescence on the undersurface of the leaflets; the blades are also scarcely reticulate above and are more obtuse at the apex than in any other variety. The type (*Burchell s. n.*), which I have not seen, was collected in the State of Goias at the Rio Par hyba. The locality assigned to the St. Hilaire collection was gleaned from his field-notes deposited in the Paris herbarium. His notation of the locality as "Par " probably means Sitio do Par  near the Rio Par hyba.

There is a temptation to subdivide the material into two taxa, one with large and widely oblong leaflets, the other with narrow leaflets shaped like a willow-leaf. Several collections of *Riedel & Lund 2522*, however, show both types of leaflets, suggesting that this segregation is untenable.

The unnumbered Damazio collection cited above, has leaflets which are bluish and glaucous above; this has not been observed in any other collection of *Sclerolobium*.

M. V. G. Fraga in *Arquivos do Servico Florestal* 3¹: 157. 1947 states that *S. paniculatum* is found in the State of Rio de Janeiro and is known commonly as "Carvoreiro" and also in Minas Gera s where it is known as "Carva  de ferreiro" as well as "Carvoreiro". No variety is specified by Fraga.

The only collection which I have seen from S o Paulo is that of *Riedel & Lund 2522*. Fraga (loc. cit. p. 131) states that *Sclerolobium* sp. is found in S o Paulo where it is commonly known as "Arapacu" and "Passuare."¹⁵

¹⁵There is good reason to believe that in this part of his work (i.e. as found on p. 131) Fraga confuses the genus *Sclerolobium* with *Schizolobium*.

- 14c. *SCLEROLOBIUM PANICULATUM* var. *RUBIGINOSUM* (Tul.) Benth. in Mart. Fl. Bras. 15²: 47. 1870.

Sclerolobium rubiginosum Tul. in Arch. Mus. Paris 4: 123. 1844 (T.: *da Silva Manso* in *Herb. Martius* 1147).

Leaflets 4–7-jugate; blades scarcely inequilateral, oblong, up to 11 cm. long, up to 7 cm. wide, obviously acuminate, the acumen up to 1 cm. long, reticulate and scarcely pubescent above, densely velutinous and ferrugineous beneath, the major secondary veins about 10; rachis of inflorescence up to 0.25 cm. wide, densely velutinous, ferrugineous, the branches wiry.

BRAZIL: MATO GROSSO: Serra do Cuiabá, *Manso & Lhotsky* s. n. (B); Cuiabá, *da Silva Manso* in *Martius Herb.* 1147 (B, F, frag., NY, W); MINAS GERAÉS: near Curvello, *Lund* 38912 (F); Rio San Francisco, *Riedel & Lund* 2918 (MO, NY).

Despite the fact that this variety superficially resembles var. *paniculatum* to a great extent, it is readily identified by the ferrugineous hairs on the undersurface of the leaflets as well as by the rachis of the inflorescence.

The common name "Pematim do Mato" is listed by Tulasne (loc. cit.).

- 14d. *Sclerolobium paniculatum* var. *peruvianum* Dwyer, var. nov. (T.: *Williams* 5701 (F)!).

Foliola in 4–5-juga disposita, coriacea, supra reticulosa infra aureo-sericea acuminata; petala linearia vel angusto-clavata, ad 3.8 mm. longa, glabra; filamenta aureo-villosa comis creberrimis; ovaria in toto pubescentia comis parum crebris evidenter appressis.

PERU: SAN MARTIN: Alto Rio Huallaga, *L. Williams* 5701 (F).

The new variety, while closely related to var. *paniculatum*, has leaflets which are thicker, wider, and more pubescent. While the golden-sericeous pubescence of the under surface of the leaflets is suggestive of var. *subvelutinum*, nevertheless its leaflets have much more prominent veins above and are more acuminate. The most important distinguishing characters are to be found in the flowers: the linear and often club-shaped petals are longer than any encountered thus far in the other varieties of *S. paniculatum*; the hairs of the filaments of the stamens are more bushy and the hairs of the ovary are less dense, more flaccid, and more appressed than found in any dissections of the collections of the species. The inflorescence seems to be racemose rather than paniculate, with the racemes elongate.

According to Macbride *S. paniculatum* is known in Peru by the common name "Ucsa-cuiro". According to Macbride, Belshaw collected *S. paniculatum* at San Martin, Peru (*Belshaw* 3477). I have not seen this collection.

15. *SCLEROLOBIUM TINCTORIUM* Benth. in Hook. Jour. Bot. 2: 236. 1850 (T.: *Spruce* 152!).

Branchlets usually canaliculate and glabrous. Leaflets 5–7-jugate. Leaves up to 35 cm. long; petioles 2.5–6.5 cm. long, slender, 0.15–

0.2 cm. wide, pubescent to scarcely pubescent, the hairs scattered and ferrugineous, or densely appressed and cano-sericeous; rachis up to 20 cm. long, flagelliform, 0.1–0.25 cm. wide; leaflets oblong-lanceolate to ovate, 3.5–10 cm. long, 2–5 cm. wide, obviously acuminate, ultimately obtuse, the acumen up to 1.5 cm. long, inequilaterally obtuse to subcordate at base, the wider side often joining costa below narrow side, thin-coriaceous, glabrous to scattered puberulent above, apparently glabrous beneath, usually very reticulate above, the costa prominulous or often seemingly plane above, about 0.1 cm. wide proximally below, the major secondary veins 6–10, prominulous above and below, arcuate. Panicles lax, the rachis slender, 1.5–2 mm. wide, nigrescent, somewhat canaliculate, densely and minutely cano-tomentose, or with a few ferrugineous hairs, much branched, the racemes cylindrical, up to 8 cm. long, the bracts not seen; bracteoles deciduous; pedicels up to 1 mm. long. Receptacle-cup up to 1.5 mm. long; sepals 2–2.3 mm. long, sericeous to lanate on both sides, the hairs short, the margin villose to villosulose; petals linear-subulate to narrowly club-shaped, 1.3–3–, rarely or to 3.8 mm. long; glabrous to scattered-pubescent; filaments linear-subulate, up to 7 mm. long, up to 0.25 mm. wide, villose to subhirsute, the hairs somewhat dense on adaxial side only; stipe of ovary 0.25–1 mm. long; ovary 1–2.8 mm. long, villose, the hairs few on valves, usually more dense on sutures, 3–5-ovulate; style 2–3 mm. long. Fruit not seen.

KEY TO THE VARIETIES

- Petals glabrous or with a few scattered hairs; ovary with hairs few on valves, dense on sutures.....15a *S. tinctorium tinctorium*
 Petals usually densely villose; ovary densely and uniformly hirsute
 15b. *S. tinctorium uleanum*

15a. *SCLEROLOBIUM TINCTORIUM* var. *TINCTORIUM*.

BRAZIL: PARA: Caripi: *Spruce* s.n. (F, photo & frag., NY, P, MO, photo, W); *Spruce* 142 (P); *Spruce* 152 (K); Belém, Granja Magoari, *Ducke* 959 (K, NY); AMAZONAS: Caracarahy, *Ducke* 1595 (MO, NY).

S. tinctorium bears a striking resemblance to *S. paniculatum* var. *paniculatum* from which it is distinguished by its sessile or subsessile flowers. A less obvious character, but one of paramount importance, is that the ovary possesses few hairs on the surface of the valves; in *S. paniculatum* the hairs of the ovary are uniformly distributed over the surface. The rachis of the inflorescence of *S. tinctorium* is consistently more slender than that of its ally. In Kew, *Spruce* 152 is designated as the type, although no number is assigned to the Spruce collection in Bentham's type description. The common name of *S. tinctorium* is "Tachy" (Ducke).

15b. *Sclerolobium tinctorium* var. *uleanum* (Harms) Dwyer, stat. nov. *Sclerolobium uleanum* Harms, in Verhandl. Bot. Ver. Brandenb. 48: 168. 1907 (T.: *Ule* 6450').
Sclerolobium weberbaueri Harms, in Fedde Repert. Sp. Nov. 18: 235. 1922. (T.: *Weberbauer* 4529').

PERU: SAN MARTIN: Zepelacio, near Moyobamba, *Klug* 3291 (F, MO); Moyobamba, *Weberbauer* 4529 (F, photo & frag., MO, photo); Lamas,

L. Williams 6467 (F); Tarapoto, *Ule* 6450 (F, photo & frag., K, MO, photo, US).

Variety *uleanum* is readily distinguished from *S. tinctorium* var. *tinctorium* by the fact that its petals are often densely villose and the ovaries are hirsute; the fact that the hairs of the ovary are uniformly distributed is of great importance.

The fruit of var. *uleanum* is known from *Weberbauer* 4529; the legumes are smooth, black, narrow-rectangular to oblong, up to 6 cm. long, up to 2.2 cm. wide, cuneate to acute at apex, acute at base.

According to Llewelyn Williams the common name is "Uisha guiro", a name similar to that of *S. paniculatum* var. *peruvianum*, "Ucscha-cuiro".

16. *SCLEROLOBIMUM GUIANENSE* Benth. in Hook. Jour. Bot. 2:237. 1850 (syntypes: *Martin* s.n., *Robt. Schomburgk* 598, *Rich. Schomburgk* 931!)

Branchlets canaliculate, glabrous to pubescent, the hairs ferrugineous. Leaflets 5–7-jugate. Leaves up to 45 cm. long; petioles slender to stout, up to 6 cm. long, up to 0.5 cm. wide, canaliculate, the rachis up to 30 cm. long, subflagellate to stout, 0.12–25 mm. wide in middle, occasionally glabrous; stipules deciduous; leaflets oblong to ovate-oblong, 4–20 cm. long, 2.5–8.5 cm. wide, short-to long-acuminate at apex, obviously inequilateral at base, often drying-dark brown, often very coriaceous, vernicose and not markedly reticulate above, the costa prominulous to plane above, up to 1.8 mm. wide at base, the major secondary veins 7–10, plane to prominulous above, prominulous to prominent beneath, the margin regular, occasionally densely villose, slender to tumescent, up to 0.8 cm. long, up to 0.3 cm. wide, densely pubescent or rarely glabrous. Panicles compressed to lax, the rachis nigrescent, subplane, canaliculate, up to 0.4 cm. wide, the hairs densely or scattered-ferrugineous, the racemes 2–7 cm. long, about 1 cm. wide at base, the rachis 0.6–1 mm. wide, the bracts (?) pectinate, 2-foliolate, the segments linear, pubescent, with the hairs ferrugineous; bracteoles narrow-subulate, up to 0.4 cm. long, caducous; pedicels about 0.5 mm. long. Receptacle-cup about 1.5 mm. long; sepals 2–2.7 mm. long, minutely sericeous on both sides, occasionally villose or lanose within, the margin villosulose; petals linear, 1.7–2.7 mm. long, about 0.075 mm. wide, glabrous to scattered-villose at base; filaments of stamens 4–5.7 mm. long, villose to hirsute all around at base, stipe of ovary 0.5–0.8 mm. long, ovary 1.7–2.5 mm. long, completely hirsute, 3–5-ovulate, style 2–3 mm. long. Legume oblong, up to 8 cm. long, up to 3 cm. wide, obtuse at apex, cuneate at base, drying chocolate brown, the exocarp cracking in middle.

KEY TO THE VARIETIES

Leaflets with secondary veins prominulous to plane above

16a. *S. guianense guianense*

Leaflets with secondary veins immersed above

16b. *S. guianense radlkoferi*

16a. SCLEROLOBIUM GUIANENSE var. GUIANENSE.

FRENCH GUIANA: without specific locality, *Martin* s.n. (B, K); Cayenne (fide Benth.), *Martin* s.n. (K).

SURINAM: Zanderij, *B. W.* 89 (K, U); Forest Reserve, Watrimiri, *B. W.* 1976 (U); Brownsberg, *Lanjouw* 1239 (K, U).

BRITISH GUIANA: without specific locality: *British Guiana Forest Dept.*: 575 (K); 582 (K); 3661 (K); *Rich Schomburgk* s.n. (F, photo, MO, photo); Roraima: *Schomburgk* s.n. (W); *Robt. Schomburgk* 598 (F, frag., K); *Rich. Schomburgk* 931 (F, photo, K, MO, photo, U); Moraballi Creek, Essequibo River, *British Guiana Forest Dept.* F466 (K); Big Wineperu Creek, Demarara Creek, *British Guiana Forest Dept.* F394 (K); mixed Aiamoradan Forest, Mazaruni Station, *British Guiana Forest Service* 925 (K); Essequibo River, Moraballi Creek, *Sandwith* 423 (K, NY, US); Isherton, Basin of Rupununi River, *A. C. Smith* 2419 (A, F, MO, NY, U, US).

VENEZUELA: BOLIVAR: Río Urimán, Alto Caroní, *Cardona* 2851 (NY, V); Río Uaiparú, branch of Icabaru, Caroní, *Cardona* 1917 (V); along Río Karuai, at base of Sororopan-tepui, w. of La Laja, *Steyermark* 60752 (F).

COLOMBIA: PUTUMAYO: Río Putumayo at San Pedro, between Umbria & Porto Asis, *Cuatrecasas*, 10543 (F, US).

BRAZIL: PARÁ: Belém, mata do Catu, *Froes* 19897 (NY), Belém, Granja Magoari, *Ducke* 959 (MO); BAHIA: Ilheos, *Luschnath* s.n. (B).

S. guianense shows considerable diversity in both floral and foliage characters. While it may appear to be a simple matter to distinguish several varieties, utilizing such features as leaflet-thickness, shape, relative density of pubescence, size of flowers, and possibly more critical floral characters, e.g. the relative distribution of the hairs on the valves of the ovary, nevertheless an examination of individual collections as represented by several sheets, reveals such an intergradation of characters that the establishment of a number of varieties may be seriously questioned. The majority of collections with wider leaflets tends to have a more ferrugineous-pubescent inflorescence with somewhat larger flowers and more stout rachises of the racemes; those with smaller leaflets show a less dense pubescence, smaller flowers and more slender rachises. When, for example, *Lanjouw* 1933, is compared on one hand with *Cuatrecasas* 10543 at one extreme, and *Steyermark* 60752 and *Rich. Schomburgk* 931 at the other extreme, division of the species into a number of varieties, on the basis of the characters cited above, becomes a more formidable task.

Richard Schomburgk 931 has obviously more coriaceous leaflets with more prominent secondary veins and more reticulate veinlets; it would appear to be deserving of varietal rank. Likewise *Cuatrecasas* 10543, with some of its leaflets narrowly oblong to rectangular, with margins densely ferrugineous, and with panicles lax and racemes slender, seems worthy of consideration as a new variety.

The presence of pectinate bracts at the base of the immature panicles of *S. guianense* suggests that its stipules may also be pectinate, although the latter were not encountered. A specimen of *S. guianense* in Kew

bears a notation of "pectinate stipules."¹⁶ One common name for *S. guianense*, "Yawarridan", is also applied to *S. micropetalum*, as well as to *Tachigalia pubiflora* Benth. A. C. Smith lists the common name "Kalili". In Venezuela we find at least two common names: "Arapari" and "Arapari-yek." In Columbia Cuatrecasas lists the common name "Guabo". In Surinam the common names are "Kadibiri", "Jaweldan Beleroe", and "Tamoene Araulama."

In Utrecht there is a sheet with several seedlings of *S. guianense* collected by the British Guiana Forest Dept. Their leaves are simple, long-petiolate, the petioles are up to 8 cm. long, and are about 0.1 cm. wide, while the very thin and reticulate leaflet-blades are ovate-lanceolate in shape, up to 15 cm. long, up to 6 cm. wide, acuminate, the acumens up to 3.5 cm. long, and the principal secondary veins about 6 per side.

16b. *Sclerolobium guianense* var. *radlkoferi* (Rusby) Dwyer, stat. nov. *Sclerolobium radlkoferi* Rusby, in Mem. Torrey Club 6: 26. 1896 (T.: *Bang 1690!*).

BOLIVIA: Tipuani-Guanai, *Bang 1690* (NY); San Antonio de Mapiri, *Buchtien 92* (F, NY); La Paz, Copacabana, s. Mapiri, *Krukoff 11020* (U); San Carlos, Mapiri, *Buchtien 1172* (B).

I have elected to retain Rusby's species as a variety, although the only substantial character appears to be the fact that the secondary veins on the upper surface are impressed. I must confess that these do not appear to be obviously immersed when the lamina is viewed with a hand-lens.

17. *Sclerolobium reticulosum* Dwyer, spec. nov. (T.: *Krukoff 7188* MO!).

Arbores magnae. Ramuli glabri vel diffuso-ferruginei. Foliola 5-7-juga. Folia 11-20 cm. longa; petioli 2.5-3 cm. longi, glabri vel diffuso-ferruginei; stipulae deciduae pectinatae segmentis 2-10 subulatis pubescentibus vel glabris; foliola angusto-elliptica vel oblonga, 2.5-10 cm. longa, 1.5-4 cm. lata, apice evidenter acuminata (rare subobtusa) acumine ad 1.5 cm. longo, basi obtusa plerumque evidenter inaequilateralia, coriacea nitida reticulosa plerumque utrimque glabra aut rare villosa comis diffuso-ferrugineis elongatis, ad 1 mm. longis, flaccidis costa gracile vix supra prominula, venis secundariis 10-12 in foliis maioribus supra vix prominulis infra prominulis arcuatis. Flores non visi; rhachides fructuum nigri vix canaliculati glabri vel minute pubescentes. Fructus angusto-lanceolati vel subrhomboidales, 4.5-9 cm. longi, 1.5-2 cm. lati, nigri plani exocarpio saepe exfoliato.

¹⁶Valuable field notes are to be found on two specimens deposited in Kew: "100' tree 20" diam. unbuttressed from mixed forest on loamy soil... (fruit) glaucous, green, oblanceolate..." (*British Guiana Forest Dept. F 394*). The second (*British Guiana Forest Dept. F925*) bears the following notation: "rounded buttresses from mixed Aimoradan forest... stipules pectinate... corolla lobes whitish-fils. bright yellow, hairy on lower half—anthers orange—ovary with long... hairs."

VENEZUELA: AMAZONAS: Sanariapo, High Orinoco, *L. Williams* 13067 (F, V).

BRAZIL: AMAZONAS: Humayta plateau between Rio Livramento & Rio Ipixuma, *Krukoff* 7148 (F, MO, NY, U); *Krukoff* 7188 (F, MO, NY).

S. reticulosum, named for the very reticulate upper surface of the leaflets, has more narrow leaflets than any other species with pectinate stipules. The lanceolate or subrhomboidal legumes are unique in shape and are apparently more narrow than the legumes of other species, being 3 to 4 times as long as broad. On his collection 7198 Krukoff records the common name "Cipoal."

18. SCLEROLOBIUM CHRYSOPHYLLUM Poepp. & Endl. Nov. Gen. et Sp. 3: 60. 1844. (T.: *Poeppig* 2666!).

Branchlets terete to angular in cross-section, nigrescent, somewhat canaliculate, glabrous to pubescent, the hairs ferrugineous and of varying length. Leaflets 5-7-jugate. Leaves up to 45 cm. long; petioles 3-6 cm. long, canaliculate, angular, often twisted usually scattered-hirsute or minutely appressed pubescent, the rachis 12-30 cm. long, often with a poorly defined basal myrmecodomatium, 5.5-8 cm. long, 0.5-0.8 cm. wide, wiry toward apex; stipules deciduous, pectinate, of 2 principal linear segments; leaflets inequilateral, narrowly or broadly oblong, 8-16 cm. long, 3-7 cm. wide, acuminate at apex, the acumen 1-1.5 cm. long, inequilateral and obtuse at base, occasionally subcuneate, coriaceous, shiny and minutely reticulate above, scattered-ferrugineous-pubescent above, the hairs more persistent on costa and veins, densely golden-sericeous below, the pubescence persistent, the costa plane to prominulous above, up to 1.3 mm. wide at base, the principal secondary veins 8-15, slender to immersed above, prominent beneath, the margin regular or vaguely irregular; petiolules 0.5-1.0 cm. long, stout, up to 0.3 cm. wide, pubescent. Panicles numerous, the rachis twisted, nigrescent, angular, scattered to densely pubescent, the racemes about 1 cm. wide at base, the bracts not seen; bracteoles deciduous, subulate, up to 3.3 mm. long, pubescent. Flowers sessile or on pedicels up to 0.8 mm. long, receptacle-cup about 1 mm. long; sepals 1.7-2.5 mm. long, thin, sericeous on both sides, the margin villosulose; petals linear, occasionally club-shaped in outline, about 2.3 mm. long 0.1-0.25 mm. wide, glabrous; filaments of stamens subulate, 3-5 mm. long, villose at base within; anthers 0.85-1.1 mm. long; stipe of ovary 0.5-1 mm. long; ovary 1.8-2 mm. long, densely hirsute, 4-ovulate; style 1.5-2.5 mm. long. Legume oblong, up to 8 cm. long, up to 3.6 cm. wide, obtuse at apex and base, the exocarp exfoliating.

VENEZUELA: BOLIVAR: La Prision, Medio Caura, *L. Williams* 11705 (F, NY, V).

PERU: SAN MARTIN: Middle Ucayali, *Tessmann* 5429 (F, frag.).

BRAZIL: without locality, *Herb. Vindob.* (ex *Herb. Reg. Monacense* 186) s.n. (W); AMAZONAS: Egá, *Poeppig* 2666 (F, including photo, MO, photo, US, photo); ACRE: mouth of Rio Macauhan, Basin of Rio Purús,

Krukoff 5469 (F, MO, NY); BAHIA: without specific locality, *Blanchet* 3206 (or 2630?) (P. W); RIO DE JANEIRO: Alto Macahé, *Glaziou* 13734 (K, P).

Bentham (loc. cit.) states that Tulasne's *S. sericeum* and Poeppig & Endlicher's *S. chrysophyllum* were both described from *Poeppig* 2666, adding that "... as Poeppig's specimen served in both cases for description, his name deserves the preference; besides this we believe he had in fact the priority, although by too short a time for Tulasne to have been aware of it."

S. chrysophyllum is the only species, in the complex of species marked by pectinate stipules, in which the leaflets are obviously reticulate above and persistently sericeous on the under surface.

Llewelyn Williams has appended very comprehensive field data on his collection 11705. In addition, in *Tropical Woods* (62:12. 1940) he refers to this same collection as having been made on "the flood-free forest ... (where) *Sclerolobium chrysophyllum* (is) one of the commonest and tallest trees ... it grows to a height of 30 m. ... the umbrella-shaped crown covered with yellow flowers. Its vernacular names are "San Francisco Negro" and "Guamo Colorado". In Brazil the common name is "Tachyrana."

Ducke (in Bol. Técn. Instituto Agronomico do Norte (Belém) 18: 133. 1949) indicates that Goeldi also collected this species at Rio Purús, in Acre, Brazil.

19. *SCLEROLOBIUM RIGIDUM* Macbr. in Field Mus. Publ. Bot. 13, part 31: 1943. (T.: *Klug* 3239).

Branchlets stout, pubescent, the hairs short, ferrugineous. Leaflets 4-8-jugate; petioles 4-8 cm. long, stout, up to 0.4 cm. wide, canaliculate, pubescent, the hairs short and ferrugineous; rachis up to 23 cm. long, up to 0.3 cm. wide, canaliculate, densely ferrugineous; stipules usually deciduous, pectinate, up to 1.5 cm. long, 2-foliolate, each segment with several subulate lobes, the hairs dense and ferrugineous; leaflets narrowly oblong to oblong, 7-15 cm. long, 2-5.5 cm. wide, obtuse at apex, often acuminate, usually inequilateral at base, obtuse to subauriculate, smooth, coriaceous, the hairs on upper side whitish, usually deciduous, except on costa where persistent near petiolule, dense ferrugineous, the hairs silky and appressed below, those on principal veins stiff and ferrugineous, the costa immersed above, up to 2 mm. wide proximally, the principal secondary veins about 12, slender above, scarcely elevated to subimmersed above, prominent beneath, strict near costa, the margin revolute. Panicles compressed, apparently shorter than uppermost leaves, the rachis up to 2.8 mm. wide, much-branched, the hairs dense and ferrugineous, the racemes up to 4 cm. long, up to 1.5 cm. wide at base; bracts and bracteoles not seen. Receptacle-cup bowl-shaped, about 2 mm. long; sepals 3-3.5 mm. long, relatively thin, densely lanose on outside, the hairs appressed, minutely pubescent within, the margin densely villosulose; petals subulate, 2-3.3 mm. long, 0.15-0.3 mm. wide, glabrous, the central vein often evident; anthers 0.9-1.2 mm. wide; filaments subulate, usually as wide in middle as at base, 3.5-5 mm. long, 0.3-0.5 mm. wide, hirsute at base, the median

and upper hairs ascending, the basal deflexed; stipe of ovary about 0.5 mm. long, the ovary 2–2.8 mm. long, densely hirsute; style about 2.2 mm. long. Fruit not seen.

PERU: LORETO: Pumayacu, *Klug 3239* (A, F, K, NY).

S. rigidum is readily distinguished on the basis of a number of characters; while the number of leaflets ranges from 5–7 pairs in the other species with pectinate stipules, here we find a range of 4–8 pairs. *S. rigidum* is the only species of the complex with the costa of the leaflets immersed above. The appressed sericeous and ferrugineous hairs, especially dense on the veins of the undersurface of the leaflets, are striking. The major secondary veins are markedly strict. Additional distinguishing features are: the bowl-shaped receptacle-cup, and the filaments of the stamens being thickly subulate and bearing deflexed hairs at the base.

The collection in Kew has a well-defined myrmecodomatium on the petioles of the leaves; this measures about 13 cm. in length and 1.5 cm. in width, has marked longitudinal fissures, and resembles a vanilla pod.

20. SCLEROLOBIUM PILGERIANUM Harms, in Engl. Bot. Jahrb. 33 (72): 24. 1903. (T.: *Glaziou 15933*!).

Branchlets glabrous, often fissured. Leaflets 3–5-jugate, up to 14 cm. long; petioles up to 2.5 cm. long, slender, about 0.1 cm. wide, glabrous; rachis 5–6.5 cm. long, apparently glabrous; stipules deciduous; leaflets subequilateral, elliptic, up to 5.5 cm. long, up to 2.2 cm. wide, vaguely acuminate, often subequilateral at base, the wider side often extending for 0.2 cm. below narrow side, thin-coriaceous, drying chocolate-brown above, smooth, glabrous, the costa subimmersed above, prominent beneath, about 0.06 mm. wide proximally, the secondary veins about 8 per side, subimmersed above, prominulous beneath, arcuate; petiolules up to 0.5 cm. long. Rachis and branches of panicles apparently stout, densely puberulent, the bracts deciduous; bracteoles twice the length of terminal buds; pedicels about 1.1 mm. long. Receptacle-cup about 2.1 mm. long; sepals 3–3.3 mm. long, densely villose on both sides, villosulose on margins; petals linear to subulate, 1.6–3 mm. long, lanate, the hairs dense, plumose; filaments 4–6 mm. long, lanate basally; anthers about 1.5 mm. long; stipe of ovary about 0.6 mm. long; ovary about 2.5 mm. long, entirely hirsute except hairs lacking in two rows on valves, 6–7-ovulate; style about 2.5 mm. long; fruit lacking.

BRAZIL: RIO DE JANEIRO: Petrópolis, Cachambú, *Glaziou 15933* (B, F, frag., MO, photo, P, US).

The fact that the costa and the secondary veins of the leaflets are immersed above would seem to place *S. pilgerianum* in section *Oriens*. However its obviously pedicellate flowers and densely pubescent petals are more suggestive of an alliance with section *Eusclerolobium*.

The leaves are apparently completely glabrous, a character shared only by *S. paraense* in section *Eusclerolobium*; the latter, however, has more pairs of leaflets.

The outstanding floral character of *S. pilgerianum* is the two longitudinal striae on the valves of the ovary due to the absence of hairs in these areas. Apparently only one other species of *Sclerolobium*, *S. striatum*, shows this same character.

21. *SCLEROLOBIUM PARAENSE* Huber, in Bol. Mus. Goeldi 6: 79. 1910.

Branchlets often rimose. Leaflets 3–4-jugate. Leaves up to 32 cm. long; petioles up to 7 cm. long, glabrous; rachis up to 12 cm. long, terete, wiry glabrous; leaflets inequilateral, lanceolate, up to 14 cm. long, up to 5.2 cm. wide, acuminate at apex, inequilateral at base, the wider side obtuse, thin-coriaceous, chocolate-brown above, reticulate (under mag.), glabrous, the costa prominulous above, subprominent beneath, about 0.1 cm. wide proximally, the major secondary veins in larger leaflets 12–15, slender, about 0.2 mm. wide above, scarcely prominulous above, prominulous below, arcuate, the margin somewhat crisp; petiolules up to 0.7 cm. long, about 0.2 cm. wide, glabrous. Panicles compressed to very lax, usually exceeding uppermost leaves, the rachis stout, 0.2–0.3 cm. wide at base, glabrous to minutely puberulent, the branches simple for as much as 10 cm., or branching almost immediately, the branches often several from one point, the racemes narrow-pyramidal, about 1 cm. wide at base, the bracts not seen; bracteoles subulate, not exceeding most terminal buds in length; pedicels about 0.7 mm. long. Receptacle-cup up to 1.5 mm. long; sepals up to 2.3 mm. long, sericeous subhirsute within, the hairs very dense; petals linear-subulate, 2–4 mm. long, circ. 0.15 mm. wide, wider at apex than middle, densely villose, the hairs usually deciduous, densely plumose at apex, the hairs flabellately disposed; filaments up to 7 mm. long, densely villose, the hairs elongate; anthers 0.8–1.1 mm. long; stipe of ovary 1–2.5 mm. long; ovary somewhat falcate, 1–2.5 mm. long, hirsute, the hairs numerous on sutures, appressed, absent or scattered on valves, 2–5-ovulate; style 1–2.5 mm. long. Fruit not seen.

BRAZIL: PARÁ: Estacao de Peixe Boi, *Rodrigues* 9642 (F, photo & frag., MO); Pau Vermelho, Thomé Assú, Acará, *Mexia* 6034 (F, K, MO, frag., NY, U); Belém, Bosque Municipal, *Ducke* 1712 (F, NY, US); Belém do Pará, *Ducke* 17032 (P, U); Rio Xingú, chemin de la Volta, *Ducke* 16603 (F, MO, photo); Peixe Boi, R.R. between Belém do Pará & Bragança, *Sigueira Herb. no. 5620* (K, NY, US).

S. paraense is known only from the State of Pará, Brazil, is one of the sclerolobiums readily recognized because of its very large stipules which are usually persistent. Except for *S. pilgerianum*, it is the only species of section *Eusclerolobium* whose vegetative parts are apparently glabrous. The most important floral character is the bushy pubescence of the inner surface of the sepals, a character not found in any other species of the genus. The petals, expanded at the apex and bearing densely plumose hairs, coupled with the ovary having an elongate stipe and few to no hairs on the valves (although dense on sutures), furnish important diagnostic characters. The falcate outline of the ovary suggests affinity with *S. urbanianum* of section *Oriens*. I have not seen the type of *S. paraense*.

22. *SCLEROLOBIUM DENSIFLORUM* Benth. in Mart. Fl. Bras. 12^o: 51. 1870. (T.: *Blanchet 3206A*!).

Branchlets canaliculate, glabrous to aureo-puberulent. Leaflets 2-3-jugate. Leaves up to 25 cm. long; petioles puberulent, the hairs golden, up to 3.5 cm. long, the rachis up to 14. cm. long, often less pubescent terminally; stipules fugacious; leaflets inequilateral, widely oblong-sublanceolate to ovate-oblong, up to 15 cm. long, up to 8 cm. wide, obviously acuminate, the acumen ultimately subacute, obviously inequilateral at base, the wider side very obtuse, coriaceous, chocolate-brown above, dull golden-yellow beneath, rugose (under mag.) and glabrous to scattered-puberulent above, densely velutinous beneath, the hairs of varying length, subuncinate and obtuse under mag., the costa prominulous above, prominent beneath, squarrose, about 0.2 cm. wide proximally, the major secondary veins 8-10 (15), slender, plane to seemingly immersed above, very prominent beneath, strict near costa, curving arcuately, ultimately parallel to margin, the latter thin-callose, subrevolute: petiolules 0.5-1.4 cm. long, densely puberulent. Panicles exceeding uppermost leaves, the rachis stout, up to 0.3 cm. wide, flexuous, the branches strict, plane, the hairs ferrugineous, the racemes 0.8-1.2 cm. wide at base; bracteoles not seen; flowers sessile. Receptacle cup about 1 mm. long; sepals 2.5-3 mm. long, sericeous to lanose on both sides, the margin villosulose; petals linear to linear-subulate or clavate, 2-3.5 mm. long, usually 0.4 mm. wide at apex, villose, the hairs flaccid, few, absent at apex; filaments subulate, up to 5 mm. long, densely villosulose adaxially below middle; anthers about 1 mm. long; stipe of ovary 0.35-1.1 mm. long; ovary 1.2-3.3 mm. long, the valves glabrous except villose on sutures, the hairs dense, elongate, ferrugineous; style 1.6-3 mm. long. Fruit not seen.

BRAZIL: without specific locality, *Luschnath* s.n. in *Martius Herb.* 1333 (B); BAHIA: without specific locality, *Tulasne?* (*Martius Herb.*) (P); *Luschnath* s.n. (or 9?) (F, frag., NY); PERNAMBUCO: Piedade, Recife, *Dardano Lima 50490* (R).

The widely oblong or oblong-lanceolate leaflets of *S. densiflorum* with their blades apparently permanently and densely golden velutinous below, and very prominent secondary veins below, immediately distinguish the species. The rugosity of the upper surface of the leaflets, coupled with the immersed character of the costa and the subplane secondary veins above, are strongly suggestive of the leaflets of *S. rugosum* of section *Oriens*. Two excellent floral characters however, indicate that its proper place is in section *Eusclerolobium*: the pedicels obvious at anthesis, and especially the ovaries being densely pubescent on the sutures.

Taubert (in Engler & Prantl Pflanzenfam. 3^o: 180. 1892) places this species in his Section *Platypetalum*, no doubt being influenced by Benthams description of the petals as "lineari-cuneata". While occasional flowers of *S. densiflorum* show clavate petals, nevertheless these do not approximate in width the petals of *S. macrophyllum*, *S. aureum* etc. which belong to the broad-petaled group.

Dardano Lima 50490 is apparently the only collection of the genus from Pernambuco. It bears the common name "Luga Porco." The

sheet in Paris on whose label is written the name "Tulasne" was probably, inasmuch as the presumed R. L. Tulasne, the French mycologist, did not collect in Brazil.

23. *SCLEROLOBIUM SETIFERUM* Ducke, in Arch. Inst. Biol. Veg. 2¹: 42. 1935 (Syntypes: *Ducke* 23329 & 24297) ¹).

Branchlets canaliculate, striate, pubescent. Leaflets 6–8–(9–?) jugate. Leaves up to 40 cm. long; petioles 4–11 cm. long, pubescent, longitudinally sulcate; rachis up to 23 cm. long, up to 0.2 cm. wide; stipules short-stipitate, the single segment elliptic-lanceolate to ovate, up to 2.5 cm. long, up to 1 cm. wide, often very revolute; leaflets subequilateral, oblong, up to 14 cm. long, up to 6 cm. wide, acuminate, subequilateral to obviously inequilateral-obtuse at base, thin-coriaceous, apparently glabrous above (except costa), diffuse-araneose to densely sericeous below, the costa immersed above, up to 0.12 cm. wide proximally, the principal secondary veins 10–15, subplane above, prominent beneath; petiolules up to 0.6 cm. long. Panicles very lax, oblong-pyramidal, the rachis up to 25 cm. long, twisted, canaliculate, densely pubescent, the branches up to 10 cm. long, 0.1–0.17 cm. wide, twisted, subplane, the bracts stipitate for 0.3–0.5 cm., with 2–3 segments, up to 2 cm. long, the blade plane or very revolute; bracteoles not seen; pedicels 0.5–1 mm. long. Receptacle-cup 1.3–2.8 mm. long; sepals up to 3 mm. long, puberulent on outside, appressed-lanate within, thin, subpellucid, the margin villosulose; petals white to pale-yellow, linear-subulate, up to 2.8 mm. long, up to 0.2 mm. wide, densely villose, the hairs plumose, deciduous; filaments up to 6 mm. long, the hairs ferruginous, spike-like, some deflexed; anthers 0.8–1.5 mm. long; pistil somewhat sigmoid in outline; stipe of ovary 1.2–1.8 mm. long; ovary 1.5–2.7 mm. long, hirsute, the hairs numerous on sutures, spreading and scattered on valves, 5–8–ovulate; style 1–3.5 mm. long. Fruit not seen.

BRAZIL: AMAZONAS: Manáus, Campos Salles, *Ducke* 23329 (F, frag., K, P); Manáus beyond João Alfredo, *Ducke* 571 (F, MO, NY, US); Esperança, mouth of Rio Javari, *Ducke* 1027 (K, MO, NY), *Ducke* 1028 (K, MO, US); ACRE: Rio Acre, Seringal Iracema, *Ducke* 24297 (US).

PERU: HUANUCO: Tingo Maria, *Burgos* 14 (F, Y); LORETO: Iquitos, Rio Itaya, *Ducke* 1814 (F, K, NY, US).

S. setiferum is one of the four species in section *Eusclerolobium* with the costa of the leaflets immersed; the other three are: *S. rigidum*, *S. goeldianum*, and *S. pilgerianum*. Except for *S. leiocalyx* its inflorescence is perhaps the most lax of all the sclerolobiums. *Burgos* 14 has the inflorescences so large and lax that they occupy almost the entire area of a standard herbarium sheet. Several well-defined floral characters mark the species: the spike-like and deflexed hairs at the base of the filaments of the stamens and the elongate stipe of the ovary; the stipe is often as long as the ovary. The fact that the hairs of the ovary are more concentrated on the sutures of the valves suggests that *S. setiferum* is related to *S. densiflorum*, *S. eriopetalum*, and *S. leiocalyx*.

Common names for *S. setiferum* are "Moena" (*Burgos* 14) and "Tachy Branco" (*Ducke* 571).

The collection *Ducke 1028* (MO, US), cited above, has no doubt been erroneously numbered and perhaps should have been numbered *1027*. *Ducke 1028* which I have seen in K, MO, NY is a syntype collection of *S. leiocalyx*.

24. *SCLEROLOBIUM ERIOPETALUM* Ducke, in Arch. Inst. Biol. Veg. Rio de Janeiro 2¹: 41. 1935. (T.: *Ducke 24296*!).

Branchlets often canaliculate. Leaflets 2–5–jugate. Leaves up to 26 cm. long; petioles 3–4.5 cm. long, puberulent; rachis 2.5–13 cm. long, slender, 0.1–0.12 cm. wide in middle, often very narrow terminally for 1 cm.; leaflets somewhat inequilateral, oblong-lanceolate, rarely ovate, up to 14 cm. long, up to 5.5 cm. wide, acuminate, the acumen up to 0.8 cm. long, ultimately obtuse or acute, obtuse and very inequilateral at base, thin-coriaceous, scattered-puberulent above, obviously appressed-sericeous below, the costa slender, pubescent, prominulous above, the secondary veins 6–9, slender, prominulous above and below, curving sharply toward margin; petiolules up to 0.8 cm. long, up to 0.15 cm. wide. Inflorescences paniculate or rarely a solitary raceme in an axil, the rachis up to 0.2 cm. wide, plane at base, unbranched for as much as 5 cm., with 2 to many divergent or arcuate-ascending branches, these slender, up to 10 cm. long, about 0.1 cm. wide at base, the racemes narrow-pyramidal, up to 1 cm. wide at base, the bracts often persistent, the stipe up to 0.4 cm. long, the solitary blade about 0.4 cm. long, obviously revolute, densely pubescent; bracteoles not seen; pedicels about 2 mm. long. Receptacle-cup about 1.8 mm. long; sepals 1.8–2 mm. long, puberulent on both sides, sparsely ciliate at base with, the margin villosulose; petals yellow, linear, about 2.3 mm. long, about 1.8 wide (including hairs), villose, the hairs densely plumose; filaments linear to subulate, 2–3.5 mm. long, up to 0.3 mm. wide at base, villose below adaxially; stipe of ovary 0.5–1 mm. long; ovary about 2 mm. long, hispid on sutures, especially on curved side, about 5–ovulate; style about 1.5 long. Fruit not seen.

BRAZIL: AMAZONAS: Manáus, Rio Taruma: *Ducke 1292* (F, MO), *Ducke 24296* (F, K, P); Manáus, Mindú, *Ducke 35095* (K, MO P, U).

S. eriopetalum, known only from Manáus, Brazil, is one of a quintet of species whose ovaries have few to no hairs on the surface of the valves, although the sutures are densely hairy. It is readily distinguished from its closest relatives, *S. leiocalyx* and *S. setiferum* by the longer pedicels of the flowers, its very short sepals, and short filaments of the stamens. The 6–9 major secondary veins of the leaflets are intermediate in number between the 10–15 of *S. setiferum* and the 6 of *S. leiocalyx*.

25. *SCLEROLOBIUM LEOCALYX* Ducke, in Bol. Técn. Inst. Agron. Norte Belém 2: 19. 1944. (Syntype: *Ducke 1028*!).

Branchlets puberulent. Leaflets 6–8–jugate. Leaves up to 50 cm. long; petioles up to 8 cm. long, smooth, pubescent; rachis up to 37 cm. long, 0.15–0.3 cm. wide in middle; stipules deciduous; leaflets subequilateral, oblong to ovate-oblong, the intermediate ones 7–13 cm. long, 4–6.5 cm. wide, acuminate, ultimately obtuse at apex, inequilateral and

subcordate at base, thin-coriaceous, reticulose, essentially glabrous except often puberulent along veins, minutely punctate (under mag.), the costa slender and plane above, prominent beneath, the major secondary veins averaging 6, prominulous above, prominent beneath; petiolules about 0.6 cm. long, 0.15–0.2 cm. wide, puberulent. Inflorescence with panicles very lax, up to 25 cm. long, pyramidal, the rachis smooth, contorted, puberulent, up to 0.5 cm. wide at base, the bracts not seen, the bracteoles fugacious, subulate, as long as pedicels 2–2.3 mm. long. Receptacle cup very carnose, the wall about 0.1 mm. thick, about 1 mm. long, with little space within; sepals up to 2.5 mm. long, the three outer farinose on outside, villosulose on inside, the inner segments glabrous on outside, occasionally punctate; petals white, linear-subulate, 2–2.3 mm. long, villose, the hairs elongate, dense, flaccid, extending to apex; filaments of stamens linear up to 5 mm. long, densely villose below middle; anthers 1.1–1.3 mm. long; stipe of ovary about 1 mm. long, ovary about 2.1 mm. long, villose, the hairs dense, flaccid, elongate, restricted to sutures, 5-ovulate; style about 2.2 mm. long. Legume obovate-oblong, 5–6 mm. long, up to 2.8 cm. wide, obtuse and subinequilateral at apex, cuneate at base, glaucous, the exocarp exfoliating.

BRAZIL: AMAZONAS: São Paulo de Olivença: *Ducke 1028* (K, MO, NY).

Ducke, in describing *S. leiocalyx* states that “foliola . . . undique glaberrima.” In examining type material I found that many mature leaflets seem to retain their pubescence on the costa and secondary veins. Likewise his statement that “lobi (calicis) glabri solum basi et marginibus minime pilosulis” demands some further explanation. The three outer sepals are often farinose on the outside and villosulose on the inner face, while the two inner sepals are glabrous exteriorly and occasionally punctate. His statement that “species (*S. leiocalyx*) calice subglabro a caeteris speciebus amazonicis divergens, exceptis *S. Macropetalum* et *S. micropetalum*” may lead to some confusion. *S. macropetalum* has completely glabrous sepals, except for the margins, but its companion species, *S. micropetalum*, has sepals which are minutely puberulent under magnification.

The leaflets, marked by their reticulate upper surface and few secondary veins, have a very slender costa which is plane above. No other species of the genus has a receptacle-cup which is so carnose and thick, and which has such a limited cavity. Likewise the flaccid and whitish hairs are not found in the other sclerolobiums.

Reference to *S. herthae* Harms, related by its author to *S. leiocalyx*, will be found following the description of *S. amplifolium*.

26. SCLEROLOBIUM MELINONII Harms, in Engl. Bot. Jahrb. 33(72): 24. 1903. (T.: *Melinon* 1861!).

Sclerolobium paniculatum Vog. in sensu Pulle, in Rec. Trav. Bot. Neerl. 4: 132. 1907, not Vogel 1837.

Branchlets ferrugineous, the hairs simple and/or stellate. Leaflets 5–7–(10)–jugate. Leaves up to 25 cm. long; petioles 1–3.5 cm. long, pubescent, rachis up to 17 cm. long, 0.1–0.15 cm. wide, pubescent, slender, flagellate; stipules not seen; leaflets somewhat inequilateral, oblong, ovate-oblong or subelliptic, 5–11 cm. long, 2–3 cm. wide, acumi-

nate, the acumen often up to 1.5 cm. long, obviously inequilateral-cordate at base drying dark brown above, stiff-chartaceous, often minutely rugose, pubescent, the hairs monaxon or stellate, the latter often more dense along veins, about 0.15 mm. wide, the rays 4-8, the costa pubescent, plane above, slender, up to 0.35 mm. wide, the major secondary veins 6-8 per side, plane to prominulous above, arcuate-ascending, margin scarcely differentiated. Inflorescence with panicles compressed and much branched, the rachis canaliculate, wiry, up to 5 cm. long, pubescent, densely flowered, the bracts not seen, the bracteoles soon deciduous, subulate, up to 4 mm. long; pedicels up to 1.3 mm. long, about 0.3 wide, pubescent. Receptacle-cup 0.8-1 mm. long; sepals 2-2.5 mm. long, puberulent on both sides, the margin villosulose; petals linear, linear-obovate to oblong, 3.5-5.5 mm. long, 0.3-0.7 (up to 2.5) mm. wide, the wider apparently retuse at apex, the hairs flaccid, few, basal; filaments of stamens unequal, 3-6 mm. long; anthers 0.8-1 mm. long; ovary 1.3-2 mm. long, the hairs flaccid, numerous to few, confined to the sutures, 4-8-ovulate; style about 2 mm. long. Legume oblong to ligulate, up to 9 cm. long, up to 2.5 cm. wide, obtuse at apex, cuneate at base, thin, drying black to tan, smooth, lustrous, reticulate, marginate, 1-seeded, the seed occupying most of pericarp.

FRENCH GUIANA: Maroni, *Melinon* s.n. (F, photo & frag., K, NY).

SURINAM: without specific locality, *Lanjouw & Lindeman* 2539 (U); Bosbeheer, *B. W.* 1069 (U); 1070 (U); 1073 (U); 's Landsbosbeheer, *B. W.* 141 (U), 206 (U); Joden Savanna, *Navy* 532 (Y), 533 (Y), 534 (Y); Zanderij I: *Stahel* 78 ? (U); *B. W.* 78 (NY, Y); *B. W.* 1388 (U); *B. W.* 1426 (U); *B. W.* 2426 (MO, U); *B. W.* 3023 (U); *B. W.* 3600 (U); *B. W.* 3909 (K, U); *B. W.* 4819 (U); *B. W.* 4858 (U); *B. W.* 5038 (K, U); *B. W.* 6213 (U); Sectie O: *B. W.* s.n. (*Herb. no.* 14) (MO), *B. W.* 1140 (U); *B. W.* 1177 (U); *B. W.* 3062 (U); *B. W.* 3643 (U); *B. W.* 4843 (U); *B. W.* 4849 (U); *B. W.* 5071 (K, U); *B. W.* 5084 (U); *B. W.* 6403 (U); Brownsberg: *B. W.* 2094 (U); *B. W.* 6379 (U); Watramiri Creek, *B. W.* 1820 (U); Nassau Mts., *Lanjouw & Lindeman* 2122 (U); Moengotapoe to Grote Zwiebelswamp, *Lanjouw & Lindeman* 493 (U); Suriname River, Suhoza, 's Landsbosbeheer, *B. W.* 58 (U).

S. melinonii is the sole representative of section *Sclerolobiastrum* and is readily distinguished by the pubescence of the leaflets. This is the only species of the genus with stellate hairs. In addition, in flowering and fruiting specimens, the leaflets are small; in fact, they are perhaps smaller than those of any other species, except *S. hypoleucum*. Except for *S. aureum* it has the most polymorphic petals among the sclerolobiums. Unfortunately no stipules were found on the material examined, although several collections have pectinate bracts subtending a very immature rachis of the inflorescence (e.g. in *Navy* 532). Measuring more than 1 cm. in length, these are apparently composed of two segments with each segment bearing several densely puberulent subulate lobes. This suggests that the stipules of *S. melinonii*, which are deciduous but undoubtedly present on very immature leaves, are pectinate.

I believe that *S. melinonii*, while worthy of segregation in a distinct section of the genus, shows strong affinities with those sclerolobiums

with pectinate stipules, particularly *S. tinctorium*. Like its ally it has very thin leaflets, oblong in shape, an inflorescence with a slender rachis, and an ovary whose hairs are more concentrated on the sutures. Occasionally linear petals are encountered in *S. melinonii*, and these, as in *S. tinctorium*, have few hairs.

Despite the number of collections cited above, few flowering collections are on deposit in herbaria. More common names have been reported for *S. melinonii* than for all the other species of *Sclerobium*. Hess & Record (in *Timbers of the New World*, p. 325, 1924) list fourteen of these.¹⁷

SECTION IV—ORIENS

- a. Leaflets in (3) 5-10 pairs.
 - b. Leaflets in 5-6 pairs; filaments of stamens villose.....28. *S. duckei*
- bb. Leaflets in 6-10 pairs; some hairs of filaments of stamens spike-like and deflexed.
 - c. Secondary veins obviously immersed; sepals lanate within; style up to 2.7 mm. long.....29. *S. rugosum*
 - cc. Secondary veins prominulous above; sepals villose within; style up to 0.8 mm. long.....30. *S. friburgense*
- aa. Leaflets in 2-4 pairs.
 - b. Leaflets obviously bullate above; hairs of filaments of stamens extending almost to apex; style up to 2.5 mm. long; ovules 2-3.....27. *S. subbullatum*
 - bb. Leaflets not obviously bullate above; hairs of filaments of stamens confined to lower half; style up to 1.2 mm. long; ovules 4-6.
 - c. Leaflets pubescent, inequilateral; hairs of filaments of stamens not spike-like and deflexed.
 - d. Leaflets up to 5 cm. wide, the costa immersed above; ovary uniformly hirsute.....31. *S. glaziovii*
 - dd. Leaflets up to 2.1 cm. wide, the costa plane above; ovary with hairs more dense on sutures.....32. *S. beaurepairei*
 - cc. Leaflets glabrous, subequilateral; some hairs of filaments of stamens spike-like and deflexed.
 - d. Leaflets thin-coriaceous to submembranaceous, the major secondary veins 10-15.....33. *S. urbanianum*
 - dd. Leaflets coriaceous, the major secondary veins about 6.....34. *S. denudatum*

27. *SCLEROLOBIUM SUBBULLATUM* Ducke in Arch. Inst. Biol. Veg. Rio de Janeiro 2: 42. 1935. (T.: *Ducke* 24298!).

Branchlets usually ferrugineous. Leaflets 2-3-jugate. Leaves up to 30 cm. long; petioles up to 6 cm. long, up to 0.35 cm. wide in middle, pubescent, occasionally tumescent; myrmecodomatium extending to rachis; rachis up to 25 cm. long, 0.2-0.7 cm. wide, angular in cross-section; stipules not seen; leaflets scarcely inequilateral, oblong, up to 16 cm. long, up to 7.7 cm. wide, obtuse to acuminate at apex, inequilaterally subcordate at base, thin-coriaceous, bullate above, pubescent above, usually velutinous below especially on costa and secondary veins, the costa plane to prominulous above, prominent beneath, about 0.13 cm. wide at base, the secondary veins 8-10 in

¹⁷These are "Alaoelama, Ararama, Araurama, Bintola, Djakidja, Jawaledan, Jawaredan, Juwaredan, Koereroe-Janaledan, Tamoene-Araurama, Tapirin-Araurana, Redji-Djedoe, Roode-Djedoe, and Witte Djedoe." Several others found on labels and not on Hess & Record's list, are: *Dja-djii-dja*, *Jawaledan beleroe*, *Tamoene Araulama*, *Jawaledan Koeleroe*, and *Tapireng Araurana*.

larger leaflets, subimmersed above, prominent beneath, strict near costa, arcuate near margin. Panicles ovate-pyramidal in outline, the rachis canaliculate, smooth, up to 11 cm. long, up to 0.2 cm. wide at base, often several per axil, the basal panicles branching 1.5–3 cm. from base of rachis, the branchlets slender, up to 0.7 mm. wide at base, the racemes linear-pyramidal, up to 0.8 cm. wide at base, the bracts not seen; bracteoles linear-subulate, up to 2 mm. long; pedicels up to 0.4 mm. long, puberulent. Receptacle cup up to 1.4 mm. long, sepals 2–2.5 mm. long, puberulent on both sides, the margin villosulose; petals white, linear, 1.8–3 mm. long, about 0.1 mm. wide, villous, the hairs few, short, absent at apex; filaments subulate, up to 5.5 mm. long, the hairs somewhat dense, extending up two thirds of length on inner side; anthers 0.8–1 mm. long; stipe of ovary 0.2–0.8 mm. long; ovary about 2 mm. long, entirely hirsute, the hairs ferrugineous, 2–3-ovulate; style about 2.5 mm. long. Legume narrow-rectangular to oblong, up to 12 cm. long, up to 3.3 cm. wide, obtuse at apex, cuneate at base, plane smooth, glistening, finely reticulate, the exocarp often cracking when dry, or exfoliating completely.

BRAZIL: AMAZONAS: Humayta near Livramento, Rio Livramento, *Krukoff* 6903 (A, F, K, MO, NY, US): Esperanca, north of Javari River, *Ducke* 24298 (K, P. type collection of *S. subbullatum*).

The most outstanding floral character of *S. subbullatum* is the extension of the hairs of the staminal filaments almost to the apex; this has not been observed in any other species of *Sclerolobium*. The reduction in the number of ovules to 2 or 3 is strongly suggestive of the relationship between *S. subbullatum* and *S. rugosum*.

As the name suggests, this species is readily recognized by the bullate character of the upper surface of the leaflets. Despite the great dimensions of the leaflets, the major secondary veins number only 8–10 and are subimmersed above, thus accounting for the bullate appearance. The occasionally plane costa, subimmersed secondary veins, and short pedicels suggest that *S. subbullatum* belongs in section Oriens, thus making it the only representative of this Section occurring in the Amazon basin. Evidence supporting its position in section Oriens are the linear petals with few hairs. In section Eusclerolobium the petals are either densely pubescent, or at the other extreme, are glabrous to very sparsely pubescent.

This species may well represent a major link between the Amazonian *S. bracteosum* of section Eusclerolobium and *S. rugosum* of section Oriens; both species have rugose and bullate leaflets with strict and subimmersed to immersed secondary veins.

28. *Sclerolobium Duckei* Dwyer, spec. nov. (T. : *Duarte de Barries* 48 (R)!).

Arbores magnae. Ramuli teretes glabri vel minute puberuli. Foliola 5–6-juga. Folia ad 35 cm. longa; petioli 2–4 cm. longi, glabri vel minute puberuli, ad 0.3 cm. lati, basi tumescentes; stipulae non visae; foliola inaequilateraliter subfalcataeque oblongo-lanceolata (minoribus saepe ovato-oblongis), 4–15 cm. longa, 3–5 cm. lata, apice gradatim in acumen attenuata, basi in latiore latere obtuse disposita, coriacea laevia brunnea

minute rugosa (sub. mag.) vix supra puberula infra sericea vel subglabra comis evidenter deciduis, costa supra gracile prominula vel plana infra prominente, venis secundariis 10–15 supra subimmersis vel subplanis infra prominulis proxime strictis denique arcuatis, marginibus vix irregularibus; petioluli subgraciles vel subtumescens, ad 0.7 cm. longi, puberuli. Paniculae compressae rhachidibus canaliculatis basi flexuosae dense velutinis racemis brevibus, 2–5 cm. longis, basi 1–1.3 cm. latis, bracteis bracteolisque non visis. Flores sessiles vel subsessiles; hypanthium circ. 2 mm. longum; sepala 2.2–2.8 mm. longa, utrimque dense villosa vel lanosa carnosae marginibus dense villosis comis crebris perplicatis plerumque elongatis; petala linearia, 1.3–4.3 mm. longa, circ. 0.1–0.15 mm. lata, villosa comis paucis diffusis saepe apice deficientibus; filamenta evidenter subulata, 3.5–5 mm. longa, 0.35–0.5 mm. basi lata dense intus villosa extus glabra comis ferrugineis; antherae circ. 1.0 mm. stipes ovarii 0.3–0.7 mm. longus, ovarium 1.7–2.5 mm. longum villosum comis crebris ubique dispositis; fructus late oblongo-elliptici, ad 11 cm. longi, ad 5 cm. lati prope dimidio lati quam longi, apice cuneati.

BRAZIL: RIO DE JANEIRO: Petrópolis, Carangola, *Goes & Constantino* 958 (R); Itatiaia: *Duarte de Barries* 48 (R, type of *S. duckei*), 57 (R); *Campos Porto* 736 (R); SAO PAULO: São José do Barreiros & Station de Formosa, *Glaziov* 10642 (P).

S. duckei, named in honor of Adolfo Ducke who described more species of *Sclerolobium* than any other worker, is closely related to *S. rugosum* and *S. friburgense*. Its multijugate leaves, however, have fewer pairs than its relatives; in addition the upper surface of the leaflets is more smooth, the costa is not prominent, and the leaflets are only subobtusate at the base. The rachis is much more slender than that of *S. rugosum*. The petals of the three species are only scattered-pubescent, and the staminal filaments are more variable in shape than in the other *sclerolobiums*.

While fruiting collections of *Sclerolobium* are few, nevertheless the large oblong-elliptic fruits of *S. duckei* may well prove to be one of the most unique in the genus.

The common name of *S. duckei* is "Luga Tabacum."

29. *SCLEROLOBIUM RUGOSUM* Mart. ex Benth. in Hook. Jour. Bot. 11: 237. 1850. (T.: *da Silva Manso* in *Martius Herb.* 1155!).

Branchlets canaliculate, golden-puberulent. Leaflets 6–10 (rarely 3)–jugate; up to 50 cm. long; petioles 3–7 cm. long, densely puberulent or rarely subglabrous; stipules fugacious, apparently with two ovate-rotund, segments, up to 1.3 cm. long, scarcely stipitate; leaflets inequilateral, narrow-oblong, the median ones 7–17 cm. long, 2.5–6 cm. wide, vaguely to distinctly acuminate, the acumen often ultimately subacute, inequilateral and obtuse at base, the wider side often extending below narrow side, thin but stiff-coriaceous, bullate and rugose above, glabrous to scattered or densely pubescent above, densely velutinous beneath, the hairs golden, the costa slender, immersed above or often seemingly plane if densely pubescent above, the major secondary in larger leaflets 13–20 immersed above, strict near costa, curving arcuately toward margin, the veinlets immersed; petiolules up to 0.8 cm. long, puberulent, the hairs

ferrugineous. Inflorescences with panicles apparently not exceeding uppermost leaves, the rachis usually obviously canaliculate, twisted, often gnarled in appearance, the branches up to 10 cm. long, up to 0.6 cm. wide, the racemes linear-pyramidal about 1.5 cm. wide at base; bracts not seen; bracteoles not seen; pedicels absent. Receptacle cup about 1.5 mm. long; sepals 2–3 mm. long, lanate on both sides, the hairs on outside shorter, the margin densely villose; petals linear to obviously narrow-rectangular, 1.8–4 mm. long, up to 0.3 mm. wide, villose, the hairs flaccid, scattered, often deciduous near apex; filaments of stamens subulate, up to 7 mm. long, 0.3–0.7 mm. wide at base, the hairs spike-like, ferrugineous, deflexed adaxially; anthers about 1 mm. long; stipe of ovary s. 3–0.9 mm. long, the ovary up to 2.7 mm. long, hirsute, the hairs ferrugineous, stiff, 4-ovulate; style about 2.7 mm. long. Fruit not seen.

BRAZIL: without specific locality: *Schück* s.n. (F); *Miers* 2498 (US); MATO GROSSO: Cuiabá, *Da Silva Manso* in *Martius Herb.* 1155 (B, K, US, MO, photo, type collection of *S. rugosum*); MINAS GERAËS: without specific locality, *Damazio* 12063 (MO); Belo Horizonte, Estrada de Santa Luzia, *Barreto* 6077 (F, R); Lagoa Santa, *Lund* 390 (F); Lagoa Santa, *Warming* 3917 (or 3911 or 3919?) (NY); Santa Luzia, Ouro Preto, *Riedel & Lund* 2919 (MO, NY); RIO DE JANEIRO: Petropolis, *Glaziov* 16757 (A, B, F, K, P, US); Estrêla, *Ducke & Kuhlmann* 19246 (U); Villa Nova, *Glaziov* 11911 (B, K, P); Estado do Cida das Meninas, *Carcerelli* 47470 (F, R); Estado do Rio Itatiaia, Monte Serrat, *Duarte de Barries* 251 (MO).

S. rugosum is characterized by a number of foliage characters, the most obvious of which is indicated by the specific name. Its very numerous leaflets have on the average, more secondary veins than found in any other species of the genus. These veins, like the costa, are frequently immersed in such a manner as to give a bullate appearance to the superior surface. Likewise the veins are more strict near the costa. The rachis of the leaves is as wide or perhaps wider, than that of any other species of the genus. Certainly the rachis of the inflorescence, usually gnarled in appearance at the base, is unique for the genus, and with the exception of *S. leiocalyx*, is wider than that of any species of the genus.

The following floral characters are worthy of special note: the variable width of the petals, the spike-like and deflexed hairs of the filaments of the stamens; the latter are markedly widely subulate. The mature fruit of *S. rugosum* is unknown despite the relatively large number of collections.

30. SCLEROLOBIUM FRIBURGENSE Harms, in Fedde Repert. Sp. Nov. 24: 211. 1928. (Syntypes: *Glaziov* 13734 & *Glaziov* 19059!).

Branchlets terete, smooth, somewhat canaliculate. Leaflets 8-jugate, up to 65 cm. long; petioles trigonous in x-section, up to 7 cm. long, up to 0.035 cm. wide in middle, smooth, glabrous; rachis up to 36 cm. long, glabrous or minutely farinose; leaflets oblong, up to 16 cm. long, up to 7 cm. wide, short-acuminate at apex, obviously inequilateral at base, the wider side obtuse, thin-coriaceous, puberulent above and below,

the costa minutely pubescent, subprominent above, about 0.1 mm. wide proximally, prominent beneath, the major secondary veins 12–15 per side, prominulous above, prominent beneath, arcuate, the margin scarcely differentiated. Inflorescence with panicles apparently not exceeding uppermost leaves, the rachis canaliculate, twisted, wiry, up to 0.25 cm. wide, minutely pubescent, the racemes up to 10 cm. long, about 1 cm. wide at base, the bracts not seen; bracteoles deciduous, up to 0.6 cm. long. Flowers sessile to vaguely pedicellate; receptacle-cup about 1.3 mm. long; sepals up to 3.2 mm. long, lanate on outside, villose within, the margin villose; petals linear, 2.3–4.5 mm. long, 0.12–0.2 mm. wide at base, the hairs moderately dense but not tufted at apex; filaments of stamens subulate, 3.3–6 mm. long, hirsute, the hairs ferrugineous, located on adaxial face only, some deflexed at base; stipe of ovary stout, basally dilated, 0.8–1 mm. long, about 0.5 mm. wide; ovary 2–3 mm. long, densely hirsute, the hairs about 0.5 mm. long, 5-ovulate; style up to 0.8 mm. long, often falcate and nestled in terminal hairs of ovary. Fruit not seen.

BRAZIL: RIO DE JANEIRO: Alto Maché de Nova Friburgo, *Glaziov* 13734 (P); *Glaziov* 19059 (B, F, K, MO, P, US, photo).

A study of both foliage and floral characters reveals that *S. friburgense* stands in an intermediate position between the other species of section *Oriens* with large leaflets: *S. subbullatum*, *S. duckei*, and *S. rugosum*, and the remaining species of the section with their smaller and fewer leaflets. Its very short style points to a close relationship with *S. glaziovii*, *S. beaurepairei*, *S. urbanianum*, and *S. denudatum*; the spike-like and deflexed hairs of the filaments of the stamens suggest an even stronger affinity with the latter two. The scarcely elevated costa and the prominulous secondary veins link it to *S. duckei*. Perhaps the most striking and individualistic floral character of *S. friburgense* is the basally dilated stipe of the pistil. According to Harms the common name of *S. friburgense* is "Cahenga."

31. *SLEROLOBIUM GLAZIOVII* Taub. in *Flora* 75 (50): 80. 1892. (T.: *Glaziov* 13735!).

Branchlets glabrous, often fissured. Leaflets 2–3-jugate, up to 25 cm. long; petioles 0.7–3 cm. long, glabrous; rachis 5–10 cm. long, 0.1–0.2 cm. wide, glabrous, wiry; stipules up to 2 cm. long, of three segments, the largest oblong, up to 1.5 cm. long, often very revolute; leaflets inequilateral, oblong to lanceolate, usually curving falcately, up to 11.5 cm. long, up to 5 cm. wide, tapering obtusely, short-acuminate, ultimately inequilateral and subcuneate at base, coriaceous, smooth and glabrous above, usually cream-colored and densely sericeous below, the hairs rarely restricted to veins, the costa immersed above, the major secondary veins 7–9 per side, immersed above, prominent beneath, the margin thin-callose; petiolules 0.2–0.4 cm. long, subtumescent. Panicles exceeding uppermost leaves, the rachis up to 0.3 cm. wide at base, glabrous to scattered pubescent, smooth, glistening, canaliculate, contorted, the branches plane, canaliculate, up to 6 cm. long, the racemes 1–1.5 cm. wide at base, cylindrical; bracts and bracteoles not seen; pedicels absent. Receptacle-cup about 1.8 mm. long; sepals 3–3.7 mm.

long, very variable in thickness, lanate on both sides (rarely glabrous within), the margin villosulose; petals yellow, linear, about 2.8 mm. long, about 0.1 mm. wide, villose, the hairs few to dense, few or absent at apex; filaments subulate, up to 5 mm. long, about 0.8 mm. wide at base, villose, the longer hairs more stiff, the shorter tufted; anthers 1.3–1.8 mm. long; stipe of pistil 1–1.4 mm. long; ovary 2–2.8 mm. long, entirely hirsute, 4-ovulate; style 1–1.2 mm. long. Legume oblong-elliptic, falcate, up to 6 cm. long, up to 2.5 cm. wide, obtuse at apex, widely cuneate at base, drying brown, reticulate, smooth, glistening, plane, marginate.

BRAZIL: RIO DE JANEIRO: without specific locality, *Glaziou* 209 (B); Floresta de Tijuca ?, *Glaziou* 13735 (F, photo, MO, photo, K, P, US, photo); Sumaré, *Oechioni* 875 (MO, P); Paineiras, *Glaziou* 1570 (B, K ?, NY).

S. glaziovii is one of the few sclerolobiums whose foliage is completely glabrous on the upper surface. The leaflets which are in 2–3 pairs, are readily distinguished from those of other species by their shape and cream-colored pubescence beneath. Apart from the reduction in the number of hairs on the valves of the ovary and the short style, the only floral character worthy of special note is the occasional glabry of the sepals on the inner surface. The rachis of the inflorescence is unusually stout at the base and the racemes wider than those encountered in the great majority of species.

On one of the sheets of *Glaziou* 1570 is the following note: "l'odeur de la fleur de ce bel arbre rapelle celle du Genet."

32. SCLEROLOBIUM BEAUREPAIREI Harms, In Engl. Jahrb. 33 (72): 23. 1903. (Syntypes: *Glaziou* 18206, 19879, 20286!).

Branchlets usually rough and fissured. Leaflets 3–4-jugate. Leaves up to 18 cm. long; petioles 1.5–3 cm. long, wiry, up to 1.5 mm. wide proximally, minutely pubescent; stipules not seen, fugacious; leaflets inequilateral, narrow-lanceolate and moderately falcate, the larger 6–8 cm. long 1.3–2.1 cm. wide, acuminate at apex, inequilateral at base, the wider side acute to subobtuse, coriaceous, minutely pubescent, often seemingly glabrous above and below, the costa slender, plane above, about 0.8 mm. wide proximally, densely pubescent above, the major secondary veins about 10, immersed above, prominulous beneath, the margin subrevolute; petiolules slender, up to 0.3 cm. long, glabrous to minutely pubescent. Panicles pyramidal in outline, shorter than or equalling uppermost leaves in length, the rachis terete to plane, usually contorted, densely puberulent, the hairs ferrugineous, the branches usually simple, up to 3.5 cm. long, the hairs ferrugineous, the racemes up to 1.2 cm. wide at base, the bracts not seen; bracteoles subulate, up to 3.5 cm. long. Receptacle-cup up to 1.5 mm. long; sepals about 2 mm. long, densely sericeous on both sides, the hairs minute, fewer within, the margin densely villose; petals narrow-subulate, 2–4 mm. long, 0.12–0.3 mm. wide at base, villose, the hairs few to dense, found on adaxial side only; filaments 3–4 mm. long, densely villose below middle; anthers about 1 mm. long; stipe of ovary 0.3–0.6 mm. long; ovary about 3 mm. long, densely hirsute, the hairs more abundant on sutures, 4–5 ovulate style up to 1.2 mm. long. Legume oblong to subfalcate up to 6 cm. long up to 2.5 cm. wide, tan-black, vernicose, reticulose, apparently monospermate.

BRAZIL: RIO DE JANEIRO: Alto Maché de Nova Friburgo, *Glaziou 18206* (B, F, NY), *Glaziou 19879*; without specific locality, *Glaziou 20286* (B, F, MO, photo, K, NY, P, US, photo); FEDERAL DISTRICT: Vista Chinesa, *Ducke 19240* (K, U, US).

S. beaurepairei apparently possesses the narrowest leaflets of the sclerolobiums. Additional characters of importance are: the subrevolute margins of the leaflets, the usually simple branches of the inflorescences, the great variation in the density of the hairs of the petals, and the ovary having its hairs more abundant on the sutures; this last character is a feature of section *Oriens*, with *S. urbanianum* representing an exception in that its hairs are deciduous from the valves during the maturation of the ovary. In section *Eusclerolobium* the concentration of ovarian hairs on the sutures is found in four species: *S. eriopetalum*, *S. densiflorum*, *S. setiferum*, and *S. leiocalyx*, and represents a character of importance.

33. SCLEROLOBIUM URBANIANUM Harms, in Engl. Bot. Jahrb. 33 (72): 23. 1903. (T.: *Glaziou 10683*!).

Branchlets usually fissured. Leaflets 2–4-jugate. Leaves up to 18 cm. long; petioles up to 3 cm. long, glabrous, often subtumescent at point of articulation; stipules not seen; leaflets scarcely inequilateral, oblong to ovate-oblong, often falcate, up to 10.5 cm. long, up to 4 cm. wide, acuminate, the acumen up to 1 cm. long, scarcely inequilateral at base, thin-coriaceous to subchartaceous obviously reticulate, glabrous, the costa plane above, prominent beneath, about 0.1 cm. wide at base below, the major secondary veins 10–15, prominulous above and below, strict near costa, curving sharply near margin (3–6 mm. below margin); petiolules up to 0.6 cm. long, glabrous. Panicles (or occasionally racemes solitary in leaf axils) lax, up to 9 cm. long, the rachis plane, up to 0.2 cm. wide at base, puberulent, the hairs densely ferrugineous, often branching at 1.5–2 cm. above base, the branches divergent, up to 4 cm. long, slender, about 0.5 mm. wide, the racemes up to 1.3 cm. wide at base, the bracts 3-foliate, the terminal one the largest, the lower stalked, very revolute; bracteoles not seen; pedicels about 0.5 cm. long. Receptacle-cup 1.5–2.5 mm. long; sepals 2.7–3 mm. long, thin, sericeous on both sides, the basal hairs somewhat more elongate, the margin densely villosulose; petals narrow-subulate 1.5–3.2 mm. long, usually about 0.15 mm. wide at base (occasionally one up to 0.3 mm. wide seen), the hairs well-spaced, ascending, elongate, flaccid, extending to apex, not densely tufted at apex; filaments linear-subulate to subulate, 3.5–5 mm. long, 0.2–0.35 mm. wide at base, occasionally as wide in middle as at base, the hairs ferrugineous, of two kinds, some spike-like and mostly reflexed, others thinner and more flaccid; stipe of ovary about 0.7 mm. long; ovary often falcate-oblong, 2–2.7 mm. long, ferrugineous-hirsute, the hairs deciduous from valves, persistent on sutures, 4–5-ovulate; style less than 1 mm. long. Fruit not seen.

BRAZIL: RIO DE JANEIRO: Rio d'Ouro, *Glaziou 10683* (F, photo & frag., K, MO, photo & frag., P).

S. urbanianum has more substantial differentiating characters than any other species of section *Oriens*. Its glabrous leaflets are usually subchartaceous, almost equilateral, and are markedly reticulate. Despite the glabry of the foliage, the rachis of the inflorescence is usually

pubescent. The filaments of the stamens have some hairs which are spike-like and deflexed, the ovary is usually curved, and the style is reduced in length; these suggest an affinity with *S. glaziovii*, *S. beaurepairei*, and *S. denudatum*. The deflexed hairs of the filaments suggest a closer relationship with *S. denudatum*. In section Oriens a deflexion of some of the hairs of the filaments is also found in *S. friburgense*.

On the Paris sheet of *Glaziou 10683* the name "Saldanha" is found: this is Jose de Saldanha da Gama.¹⁸

34. SCLEROLOBIUM DENUDATUM Vogel, in Linnaea 11: 396. 1837.
(T.: Sellow s.n.!).

Branchlets glabrous, canaliculate. Leaflets 3-4-jugate. Petioles up to 3.5 cm. long, glabrous; stipules 1-2-foliate, up to 3.5 cm. long, scarcely stipitate, the larger segment up to 3 cm. long, up to 2.5 cm. wide; leaflets often seemingly equilateral, oblong, up to 9 cm. long, up to 5 cm. wide, obtuse and ultimately short-acuminate at apex, obtuse to cuneate at base, stiff-coriaceous, glabrous, lustrous above, the costa immersed above, the major secondary veins about 6 per side, slender, immersed above, prominent beneath; petiolules up to 0.5 cm. long, glabrous. Panicles equal in length or exceeding uppermost leaves, flabellately disposed, the rachis smooth, twisted, about 0.3 cm. wide at base, glabrous or minutely scattered puberulent, bracts not seen; bracteoles stipule-like, up to 2.2 cm. long. Flowers sessile, the receptacle-cup about 1.5 mm. long; sepals 2.5-3.3 mm. long, sericeous on both sides, the margin villosulose; petals linear to linear, subulate, 3.3-3.8 mm. long, up to 0.28 mm. wide, villose, the hairs scattered, often subtufted at apex; filaments subulate, up to 7 mm. long, subvillose below middle; anthers 1-1.6 mm. long; stipe of ovary up to 1.8 mm. long; ovary about 3 mm. long, hirsute, the hairs stiff, ferrugineous, 5-6-ovulate; style about 1 mm. long. Legume subfalcate to elliptic, up to 9 cm. long, up to 3.3 cm. wide, tapering cuneately into an obtuse tip, cuneate at base, smooth, the exocarp exfoliating.

BRAZIL: RIO DE JANEIRO: "Bras. Merid.", Sellow s.n. (F, photo & frag., K, MO, US, photo); SAO PAULO: Botanical Garden, *Hoehne 20917* (A, F, NY, Y).

S. denudatum, the first species described in the genus, is aptly named; the vegetative parts are completely glabrous and frequently the rachis of the inflorescence is glabrous. The species is readily recognized by its very short and oblong leaflets; these tend to be subequilateral and have relatively few major secondary veins.

In the type collection at Kew one legume was noted as being slipper-shaped in outline with a median indentation on each side.

Bentham in Mart. Fl. Bras. cites three collections: the Sellow collection, an unnumbered collection by Schüch from Mt. Corcovado in Rio de Janeiro, and *Glaziou 1570* from Capanema (Rio de Janeiro).¹⁹ I have seen several *Glaziou* sheets bearing the number 1570. All of these are *S. glaziovii*.

¹⁸On the same label is another name, probably Ramio Gahiro; I have been unable to locate a collector by this name.

¹⁹Perhaps something of importance may have been omitted in Bentham's citation. Apparently there should be a semicolon after "Schuch", inasmuch as the remainder of the citation is "de Capanema, *Glaziou 1570*."

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Nomenclatorial Notes in the Dendrobium Alliance

ALEX D. HAWKES and A. H. HELLER

During the preparation of a definitive check-list of the orchid subtribe *Dendrobiinae*—the *Dendrobium* alliance—a rather sizeable series of nomenclatorial alterations has proven necessary. In certain instances, these involve transfers of taxa; in others, because of homonymic duplications of epithets, new names have to be proposed. The present paper discusses these alterations.

1. DENDROBIUM Swartz

Dendrobium Blanche-Amesii, Hawkes & Heller, nom. nov.

Dendrobium verruculosum Ames in Phil. Jour. Sci. 8: 426. 1914, not Schltr., 1912.

Ames' *D. verruculosum* is indigenous to the Philippines (Luzon and Leyte), and is entirely distinct from Schlechter's earlier New Guinean plant. The new epithet is given this species in honor of Blanche (Mrs. Oakes) Ames, in partial recognition of her magnificent illustrative studies of the Orchidaceae.

Dendrobium Buffumii, A. D. Hawkes, nom. nov.

Dendrobium roseoflavidum Schltr. in Engl., Bot. Jahrb. 58: 104. 1923, not Schltr., 1912.

Schlechter's use of the epithet *roseoflavidum*, for two different *Dendrobiums*, both of them native to New Guinea, necessitates a new name for the homonymic one. The epithet here proposed is given in honor of Pauline (Mrs. John) Buffum, of North Miami, Florida, close friend of the senior author, and long a *Dendrobium* enthusiast.

Dendrobium Christianae, A. H. Heller, nom. nov.

Dendrobium capitellatum Krzl. in Engl., Pflanzenr. 4, 50, ii, B, 21: 215. 1910, not J. J. Sm., 1906.

Kraenzlin's *D. capitellatum* was described from materials gathered in Celebes, while the earlier *D. capitellatum* of J. J. Smith is a completely different plant from Burma, Siam, and Malaysia. The new epithet is given in honor of Christiane (Mrs. A. H.) Heller.

Dendrobium Correllianum, Hawkes & Heller, nom. nov.

Dendrobium tricolor Krzl. in Engl., Pflanzenr. 4, 50, ii, B, 21: 187. 1910, not Pers., 1832.

Kraenzlin evidently was unaware of the existence of Persoon's *Dendrobium tricolor* (now referable to *Lycaste tricolor* (Kl.) Rchb. f.), when he proposed his species, a native of New Guinea. A new name is necessary, and the one proposed here is given in honor of Dr. Donovan S. Correll, long an ardent student of the Orchidaceae and its vagaries.

Dendrobium Dillonianum, Hawkes & Heller, nom. nov.

Dendrobium sacculiferum J. J. Sm. in Nova Guinea 14: 434. 1929, not J. J. Sm., 1922.

Smith utilized the name *sacculiferum* for two different *Dendrobiums*, the present one from New Guinea, the earlier from Ternate in the

Moluccas. The new epithet is given in honor of Mr. Gordon W. Dillon, Editor of the American Orchid Society's *Bulletin*, and artist whose expert delineations have measurably increased our enjoyment of the orchids.

***Dendrobium distichophyllum*, Hawkes & Heller, nom. nov.**

Dendrobium rupicolum Ridl. in Jour. Fed. Malay States Mus. 6: 174. 1915, not *D. rupicola* Rehb. f. ex Krzl., 1910.

Ridley's *D. rupicolum* is a distinct plant from the one taken up by Kraenzlin from Reichenbach's specimens in 1910. The new name for this species from the Malay Peninsula is given in reference to its foliar habit.

***Dendrobium Gagnepaini*, Hawkes & Heller, nom. nov.**

Dendrobium minutiflorum Gagnep. in Bull. Mus. Hist. Nat. Paris II, 21: 741. 1950, not Krzl., 1914.

The new epithet for this species from Indochina (Annam)—necessary because of its homonymic status—is given in honor of Dr. François Gagnepain, noted student of the Orchidaceae of that country.

***Dendrobium Garayanum*, Hawkes & Heller, nom. nov.**

Dendrobium inaequale Finet in Bull. Soc. Bot. France 50: 375. 1903, not Rolfe, 1901.

Finet's plant from New Caledonia is totally distinct from the one described earlier by Rolfe from New Guinea. The new epithet is given in honor of Dr. Leslie A. Garay, Assistant Curator of the Herbarium at the University of Toronto, who in recent years has done much to clarify our knowledge of orchids.

***Dendrobium Hawkesii*, A. H. Heller, nom. nov.**

Dendrobium vagans Gagnep. in Bull. Mus. Hist. Nat. Paris II, 22: 398. 1950, not Schltr., 1911, nor Schltr., 1923.

Gagnepain's *D. vagans* is a plant distinct from both of Schlechter's species, hence a new name is necessary. The epithet here proposed for this orchid from Indochina (Annam) is given in honor of Alex D. Hawkes, Editor of *The Orchid Journal*.

***Dendrobium Hellerianum*, A. D. Hawkes, nom. nov.**

Dendrobium inflatum Schltr. in Fedde, Repert. Spec. Nov., Beih. 1: 620. 1912, not Rolfe, 1895.

The new epithet for this New Guinean species—necessary because of its homonymic status—is given in honor of Alfonse H. Heller, who has done much to further our knowledge of the Orchidaceae, through his assemblage of one of the world's finest private collections of living plants of this group.

***Dendrobium Hendersoni*, Hawkes & Heller, nom. nov.**

Dendrobium fugax Schltr. in Bull. Herb. Boiss. II, 6: 455. 1906, not Rehb. f., 1871.

Schlechter's *D. fugax* has been recorded from several parts of the Malay Peninsula, Sumatra, and Borneo, while the earlier species of Reichenbach is a distinct Indian plant. The new epithet is given in

honor of Dr. M. R. Henderson, late Director of the Botanic Gardens at Singapore, and long a student of the Malayan orchids.

Dendrobium Holttumianum, Hawkes & Heller, nom. nov.

Dendrobium sanguineum Rolfe in Gard. Chron. (2): 292. 1895, not Sw., 1799.

Rolfe was evidently unaware of Swartz's use of the name *Dendrobium sanguineum*—an entity now referable to *Broughtonia sanguinea* (Sw.) R. Br.—when he proposed this Bornean species. The new epithet is given in honor of Dr. R. Eric Holttum, author of the exhaustive study, *The Orchids of Malaya* (1953), as well as many other publications on the flora of that area.

Dendrobium indochinense, Hawkes & Heller, nom. nov.

Dendrobium subsessile Gagnep. in Bull. Mus. Hist. Nat. Paris II, 22: 398. 1950, not Schltr., 1912.

Gagnepain's *D. subsessile*, from Annam in Indochina, is an entirely distinct species from that of Schlechter, which is a native of New Guinea.

Dendrobium Katherinae, A. D. Hawkes, nom. nov.

Dendrobium pachyanthum Schltr. in Fedde, Repert. Spec. Nov., Beih. 1: 589. 1912, not Schltr., 1911.

Schlechter's use of the epithet *pachyanthum* for two different *Dendrobiums* necessitates a new name for the homonymic one, this a native of New Guinea. The name here proposed is given in honor of the senior writer's mother, Katherine Hawkes Chatham, who for many years has given him inspiration in his work with orchids.

Dendrobium Kirchianum, Hawkes & Heller, nom. nov.

Dendrobium bulbophylloides J. J. Sm. in Fedde, Repert. Spec. Nov. 12: 31. 1913, not Schltr., 1912.

Smith's *D. bulbophylloides* is a New Guinean plant, distinct from the earlier one of Schlechter, also indigenous to that island. The new epithet is given in honor of Mr. William Kirch, of Honolulu, who has accomplished much in the furtherance of interest in orchids and their cultivation in our time.

Dendrobium Millarae, A. D. Hawkes, nom. nov.

Dendrobium dischorensense Schltr. in Fedde, Repert. Spec. Nov., Beih. 1: 642. December 1912, not J. J. Sm., October 1912.

Schlechter's use of the name *D. dischorensense* only two months after the publication of that of Smith makes a new epithet obligatory for this New Guinean plant. The name proposed here is given in honor of Andrée (Mrs. John M.) Millar, of Lae, New Guinea, through whose collections our knowledge of the orchid flora of this great island is being materially increased.

Dendrobium Moirianum, A. D. Hawkes, nom. nov.

Dendrobium puniceum Rolfe in Kew Bull. 146. 1901, not Ridl., 1886.

Rolfe's *D. puniceum* was described from materials collected in Papua, while Ridley's plant, a different one, is from another part of New Guinea. The new epithet is given in honor of Mr. and Mrs. W. W.

G. Moir, of Honolulu, who have done much to increase the interest in the "lesser-known" orchids in Hawaii, through their marvelous private collections.

Dendrobium neo-guineense, Hawkes & Heller, nom. nov.

Dendrobium longicaule Schltr. in Engl., Bot. Jahrb. 58: 115. 1923, not J. J. Sm., 1910.

Schlechter apparently was not aware of Smith's previous use of the name *D. longicaule*, when he proposed his species in 1923 for a distinct plant from New Guinea.

Dendrobium nutantiflorum, Hawkes & Heller, nom. nov.

Dendrobium nutans Ldl., Gen. & Sp. Orch. Pl. 90. 1830, not Presl, 1827. *Callista nutans* O. Ktze., Rev. Gen. Pl. 2: 655. 1891.

Lindley's name for a plant which is native in Ceylon and India is pre-dated by that of Presl (now referable to *Geodorum nutans* (Presl) Ames). The new epithet here proposed is in reference to the flowering habit of the plant.

Dendrobium Oscari, Hawkes & Heller, nom. nov.

Dendrobium floribundum Rehb. f. in Gard. Chron. (2): 772. 1875, not D. Don, 1848.

Reichenbach's plant from the New Hebrides is a totally distinct one from that of Don, a native of Nepal. The new epithet is given in honor of Mr. Oscar M. Kirsch, long one of the leaders in the production of notable *Dendrobium* hybrids in the Hawaiian Islands.

Dendrobium Otaguroanum, A. D. Hawkes, nom. nov.

Dendrobium chloroleucum Schltr. in Fedde, Repert. Spec. Nov., Beih. 1: 490. August 1912, not Ridl., June 1912.

Schlechter's *D. chloroleucum* is a New Guinean plant, distinct from the earlier Malayan species of Ridley, which is now referable to *D. subflavidum* Ridl. The new epithet which we propose for Schlechter's plant is given in honor of Mr. Wallace H. Otaguro, Editor of *Na Pua Okika O Hawaii Nei*, and long a leader in orchid advancement in the Hawaiian Islands.

Dendrobium Priscillae, A. D. Hawkes, nom. nov.

Dendrobium Fairfaxii Rolfe in Gard. Chron. (1): 798. 1889, not Fitzg. & FvM., 1872.

Rolfe's *D. Fairfaxii* is an orchid from the New Hebrides, totally distinct from the Australian *D. Fairfaxii* of Fitzgerald and von Mueller, which is now referred to *D. teretifolium* R. Br. var. *Fairfaxii* (Fitzg. & FvM.) Fitzg. The new epithet is given in honor of Priscilla (Mrs. A. L. Y.) Ward, of Honolulu, with sincere thanks for patient assistance to the senior writer.

Dendrobium Putnami, Hawkes & Heller, nom. nov.

Dendrobium coerulescens Schltr. in Fedde, Repert. Spec. Nov., Beih. 1: 531. 1912, not Wall. ex Ldl., 1835.

Schlechter was apparently unaware of the use of the name *D. coerulescens* by Wallich in a Lindleyan publication many years previously; this plant is now referred to *D. nobile* Ldl. var. *coerulescens*

(Wall. ex Ldl.) Rchb.f. The new epithet for Schlechter's New Guinean species is given in honor of Mr. Charles S. Putnam, long a guiding spirit in orchid cultivation on the Island of Hawaii, and for many years Editor of the *Bulletin* of the Hawaii Orchid Society.

***Dendrobium Quisumbingii*, Hawkes & Heller, nom. nov.**

Dendrobium MacGregori Ames in Phil. Jour. Sci. 7: 17. 1912, not FvM. & Krzl., 1894.

Ames' *D. MacGregori* is a Philippine orchid, totally distinct from the plant described earlier by von Mueller and Kraenzlin from New Guinea and the Louisiades Archipelago. The new epithet is given in honor of Dr. Eduardo Quisumbing, of the Philippine National Museum, who has materially augmented our knowledge of the Orchidaceae of that country.

***Dendrobium Rolfei*, Hawkes & Heller, nom. nov.**

Dendrobium clavatum Ldl. in Wall., Catal., no. 2004. 1828, not Roxb., 1814, nor Ldl., 1851-52.

The name *Dendrobium clavatum* has been applied to three distinct species. The first of these is that of Roxburgh, dating from 1814; this entity is now referable to *D. amabile* (Lour.) O'Brien. The third use of this name was by Lindley in Lindley and Paxton's *Flower Garden* (1851-52); this plant has been re-named *D. Denneanum* by Kerr. The second use of *D. clavatum*—applying to still another plant—has not as yet been clarified, and we herewith propose the above new epithet, this given in memory of Dr. R. Allen Rolfe, long one of the world's leading orchidologists. *Dendrobium Rolfei* is widespread in the Himalayan region, and extends into Yunnan in China.

***Dendrobium roseicolor*, Hawkes & Heller, nom. nov.**

Dendrobium roseum Schltr. in Fedde, Repert. Spec. Nov., Beih. 1: 514. 1912, not Sw., 1805.

Schlechter apparently was unaware of the existence of Swartz's *Dendrobium roseum* (now referable to *Polystachya elastica* Ldl.) when he established his New Guinean plant, for which we propose the above new epithet.

***Dendrobium Rudolphii*, Hawkes & Heller, nom. nov.**

Dendrobium Ridleyanum Kerr in Kew Bull. 218. 1927, not Schltr., 1905.

Kerr's *D. Ridleyanum* is a Siamese plant, entirely different from the earlier one described by Schlechter, which is now referable to the genus *Diplocaulobium* (Rchb.f.) Krzl. The new epithet is given in memory of Dr. Rudolph Schlechter, one of the great orchidologists of history.

***Dendrobium Schweinfurthianum*, Hawkes & Heller, nom. nov.**

Dendrobium leopardinum Schltr. in Fedde, Repert. Spec. Nov., Beih. 1: 578. 1912, not Wall., 1843.

Schlechter's *D. leopardinum* is pre-dated many years by Wallich's Nepalese plant, which is now referred to *Bulbophyllum leopardinum* (Wall.) Ldl. The new epithet for Schlechter's New Guinean species is given in honor of Mr. Charles Schweinfurth, Curator of the Ames Orchid Herbarium at Harvard University.

Dendrobium Shipmani, A. D. Hawkes, nom. nov.

Dendrobium confusum Schltr. in Fedde, Repert. Spec. Nov. 10: 72. November 1911 not J. J. Sm., March 1911.

Schlechter's *D. confusum* is a totally different species from the New Guinean plant described by J. J. Smith (which is now referable to *Dendrobium capituliflorum* Rolfe). The new epithet here proposed is given in honor of Mr. Herbert C. Shipman, of Hilo, Hawaii, long a leader in furthering interest in orchid cultivation.

Dendrobium sikkimense, Hawkes & Heller, nom. nov.

Dendrobium pauciflorum King & Pantl. in Jour. As. Soc. Bengal 64 (2): 332. 1895, not Reinw. ex Bl., 1854.

King and Pantling's *D. pauciflorum* is a native of Sikkim, and is totally distinct from the earlier plant proposed by Reinwardt in a publication of Blume, which is now referred to *Ania plicata* Ldl.

Dendrobium singaporense, Hawkes & Heller, nom. nov.

Dendrobium teres Ldl. in Bot. Reg. 29: Misc. 111. 1840, not Roxb., 1814. *Callista teres* O. Ktze., Rev. Gen. Pl. 2: 655. 1891.

Lindley's *D. teres* is found in Singapore and other parts of the Malay Peninsula, and is a completely distinct plant from the earlier one of Roxburgh, which is now referred to *Vanda teres* (Roxb.) Ldl.

Dendrobium sumatranum, Hawkes & Heller, nom. nov.

Dendrobium cultriforme J. J. Sm. in Icon. Bogor. 2: pl. 208. 1906, not Thou., 1822.

Smith's *D. cultriforme*, from Sumatra, is a totally distinct plant from the earlier one of du Petit Thouars, now referable to *Polystachya cultriformis* (Thou.) Ldl. ex Spreng.

Dendrobium Summerhayesianum, Hawkes & Heller, nom. nov.

Dendrobium pictum Schltr. in Fedde, Repert. Spec. Nov., Beih. 1: 595. 1912, not Griff. ex Ldl., 1859, nor Ldl., 1862.

Schlechter's *D. pictum* is a New Guinean orchid, entirely different from either that described by Griffith in a paper of Lindley's in 1859 (now referable to *D. Devonianum* Paxt.) or that described by Lindley in 1862, which is a Bornean species. The new epithet is given in honor of Dr. Victor S. Summerhayes, of the Royal Botanic Gardens, Kew, England, long an avid student of the Orchidaceae.

Dendrobium Swartzii, Hawkes & Heller, nom. nov.

Dendrobium lilacinum Rehb. f. in Gard. Chron. 674. 1865, not Teijsm. & Binn., *Callista lilacina* O. Ktze., Rev. Gen. Pl. 2: 654. 1891.

Reichenbach's *D. lilacinum* is a Bornean plant, quite distinct from the earlier Javanese one established by Teijsmann and Binnendijk. The new epithet is given in memory of Olaf Swartz, who established the genus *Dendrobium*.

Dendrobium vagabundum, Hawkes & Heller, nom. nov.

Dendrobium vagans Schltr. in Engl., Bot. Jahrb. 58: 120. 1923, not Schltr., 1911, nor Gagnep., 1950.

Schlechter's use of *Dendrobium vagans* in 1923 for this New Guinean plant was a duplication of his 1911 Samoan species, as was also Gagne-

pain's use of the name same in 1950 for a third still distinct Indochinese orchid (see *Dendrobium Hawkesii*, *supra*). The above new name is therefore proposed for the New Guinean species.

Dendrobium x von Paulsenianum, A. D. Hawkes, nom. nov.

Dendrobium x intermedium Schltr. in Fedde, Repert. Spec. Nov., Beih. 1: 523. 1912, not Teijsm. & Binn., 1853, nor Ridl., 1895.

Schlechter's *D. x intermedium* is a natural hybrid between *D. Lawesii* FvM. and *D. flammula* Schltr., native in New Guinea. It is completely distinct from either the *D. intermedium* of Teijsmann and Binnendijk, now referable to *D. salaccense* (Gl.) Ldl., or that of Ridley, now referable to *D. Ridleyi* Merr. The new epithet for this most interesting orchid is given in honor of Captain and Mrs. Carl C. von Paulsen, of "Fiddler's Green," Homestead, Florida, who have amassed one of the world's finest collections of members of the present genus.

Dendrobium Wallichii, Hawkes & Heller, nom. nov.

Dendrobium pygmaeum Ldl. in Wall., Catal., no. 1999. 1828, not Smith in Rees, 1818.

Lindley's *D. pygmaeum* is an orchid from the Himalayas and Burma, and has no connection with the earlier one of Smith, which is now referred to *Bulbophyllum pygmaeum* (Smith) F. M. Bail. The new epithet is given in memory of Nathaniel Wallich, one of the foremost of the early botanical collectors in the Himalayan region.

2. DESMOTRICHUM Bl.

Desmotrichum annamense, A. D. Hawkes, nom. nov.

Desmotrichum forcipatum Gagnep. in Bull. Mus. Hist. Nat. Paris II, 22: 399. 1950, not Krzl., 1910.

Gagnepain's *D. forcipatum* is a completely distinct species from that established earlier by Kraenzlin. The new epithet here proposed is in reference to the country of origin of the present plant—Annam.

Desmotrichum bicarinatum (Ames & Schweinf.)

A. D. Hawkes, comb. nov.

Dendrobium bicarinatum Ames & Schweinf. in Ames, Orchid. 6: 98. 1920.

Since we recognize *Desmotrichum* Bl. as a genus separate from *Dendrobium* Sw., the above transfer is necessary for this Bornean plant.

Desmotrichum Eurorum (Ames) A. D. Hawkes, comb. nov.

Dendrobium Eurorum Ames, Orchid. 5: 124. 1915.

The transfer from *Dendrobium* for this orchid from Leyte in the Philippines has not previously been made.

Desmotrichum flabelliforme (Schltr.) A. D. Hawkes, comb. nov.

Dendrobium flabelliforme Schltr. in Fedde, Repert. Spec. Nov., Beih. 1: 454. 1912.

The transfer from *Dendrobium* for this orchid from New Guinea's Torricelli Mountains has not previously been made.

Desmotrichum homoglossum (Schltr.) A. D. Hawkes, comb. nov.*Dendrobium homoglossum* Schltr. in Fedde, Repert. Spec. Nov., Beih. 1: 456. 1912.

The transfer from *Dendrobium* for this species from the Finisterre Mountains of New Guinea has not previously been made.

Desmotrichum integrilabium (J. J. Sm.) A. D. Hawkes, comb. nov.*Dendrobium integrilabium* J. J. Sm. in Icon. Bogor. 2: 91, pl. 117-B. 1903.

The Javanese species has not previously been transferred from *Dendrobium*.

Desmotrichum interjectum (Ames) A. D. Hawkes, comb. nov.*Dendrobium interjectum* Ames, Orchid. 5: 125. 1915.

Native in Leyte in the Philippines, this species has not previously been transferred from *Dendrobium*.

Desmotrichum longirepens (Ames & Schweinf.)

A. D. Hawkes, comb. nov.

Dendrobium longirepens Ames & Schweinf. in Ames, Orchid. 6: 105. 1920.

The transfer from *Dendrobium* for this species from Borneo has not previously been made.

Desmotrichum padangense (Schltr.) A. D. Hawkes, comb. nov.*Dendrobium padangense* Schltr. in Engl., Bot. Jahrb. 45, Beibl. 104: 28. 1911.*Desmotrichum compressibulbum* Carr in Gard. Bull. Straits Settlem. 7: 7. 1932.

Carr's *D. compressibulbum* is referable to *Dendrobium padangense* Schltr., hence the above new combination is necessary for this species from the Malay Peninsula and Sumatra.

Desmotrichum pemaie (Schltr.) A. D. Hawkes, comb. nov.*Dendrobium pemaie* Schltr. in Fedde, Repert. Spec. Nov., Beih. 1: 455. 1912.

The transfer from *Dendrobium* for this species from New Guinea has not previously been made.

Desmotrichum pseudoconvexum (Ames) A. D. Hawkes, comb. nov.*Dendrobium pseudoconvexum* Ames, Orchid. 5: 135. 1915.

This species from Luzon in the Philippines has not previously been transferred from *Dendrobium*.

Desmotrichum pumilum (Roxb.) A. D. Hawkes, comb. nov.*Dendrobium pumilum* Roxb., Hort. Beng. 61. 1814; and Fl. Ind. 3: 479. 1832.

Desmotrichum pusillum Bl., Bijdr. 329. 1825. *Dendrobium pusillum* Ldl., Gen. & Sp. Orch. Pl. 77. 1830. *Dendrobium carnosum* Teijsm. & Binn. in Tijdschr. Nederl. Ind. 5: 489. 1853. *Callista pachyphylla* O. Ktze., Rev. Gen. Gen. Pl. 2: 654. 1891. *Callista pumila* O. Ktze., Rev. Gen. Pl. 2: 655. 1891. *Callista pusilla* O. Ktze., Rev. Gen. Pl. 2: 655. 1891.

Roxburgh's *Dendrobium pumilum* pre-dates *Desmotrichum pusillum* Bl. by several years, hence the above new combination is necessary. This variable species has been found in India, the Himalayas, Malay Peninsula, Riauw Archipelago, Sumatra, Java, and Borneo.

Desmotrichum purpureostelidium (Ames) A. D. Hawkes, comb. nov.

Dendrobium purpureostelidium Ames, Orchid. 5: 136. 1915.

This species has been recorded from Luzon, Leyte, Mindanao, and Basilan in the Philippines; it has not previously been transferred to *Desmotrichum*.

Desmotrichum rhipidolobum (Schltr.) A. D. Hawkes, comb. nov.

Dendrobium rhipidolobum Schltr. in K. Schum. & Lauterb., Nachtr. Fl. Deutsch Südsee 151. 1905, in part. *Desmotrichum fimbriatum* Krzl. in Engl., Pflanzenr. 4, 50, ii, B, 21: 354. 1910, in part, not Bl.

This somewhat confused entity from New Guinea has not previously been transferred from *Dendrobium*.

Desmotrichum rhopalobulbon (Schltr.) A. D. Hawkes, comb. nov.

Dendrobium rhopalobulbon Schltr. in Bull. Herb. Boiss. II, 6: 457. 1906.

This Sumatran species has not previously been transferred from *Dendrobium*.

Desmotrichum simplicicaule (J. J. Sm.) A. D. Hawkes, comb. nov.

Dendrobium simplicicaule J. J. Sm. in Nova Guinea 14: 409. 1929.

A native of New Guinea, this species has not been transferred previously from *Dendrobium*.

Desmotrichum unicorn (Ames) A. D. Hawkes, comb. nov.

Dendrobium unicorn Ames, Orchid. 5: 140. 1915.

This species is known from Luzon and Leyte in the Philippines; it has not been transferred previously from *Dendrobium*.

3. DIPLOCAULOBIMUM (Rchb.f.) Krzl.

Dendrobium Sw. section *Diplocaulobium* Rchb. f. in Jour. Linn. Soc. 15: 112. 1876.

Dendrobium Sw. section *Mekynosepalum* Schltr. in K. Schum. & Lauterb., Nachtr. Fl. Deutsch. Südsee 149, 152. 1905.

Diplocaulobium abbreviatum (Schltr.) A. D. Hawkes, comb. nov.

Dendrobium abbreviatum Schltr. in Fedde, Repert. Spec. Nov., Beih. 1: 466. 1912.

Since we recognize *Diplocaulobium* (Rchb.f.) Krzl. to represent a genus distinct from *Dendrobium* Sw., the above transfer for this New Guinean species is necessary.

Diplocaulobium aureicolor (J. J. Sm.) A. D. Hawkes, comb. nov.

Dendrobium aureicolor J. J. Sm. in Bull. Dép. Agric. Ind. Néerl. 15: 3. 1911.

This New Guinean species has not previously been transferred from *Dendrobium*.

Diplocaulobium cadetioides (Schltr.) A. D. Hawkes, comb. nov.

Dendrobium cadetioides Schltr. in Fedde, Repert. Spec. Nov., Beih. 1: 467. 1912.

This odd species from the Maboro Mountains of New Guinea has not previously been transferred from *Dendrobium*.

Diplocaulobium carinulatidiscum (J. J. Sm.) A. D. Hawkes, comb.

Dendrobium carinulatidiscum J. J. Sm. in Nova Guinea 14: 407. 1929.

Indigenous to New Guinea, this species has not previously been transferred to *Diplocaulobium*.

Diplocaulobium chrysotropis (Schltr.) A. D. Hawkes, comb. nov.

Dendrobium chrysotropis Schltr. in K. Schum. & Lauterb., Nachtr. Fl. Deutsch. Südsee 159. 1905.

This New Guinean species has not previously been transferred from *Dendrobium*.

Diplocaulobium Clemensiae (Ames) A. D. Hawkes, comb. nov.

Dendrobium Clemensiae Ames in Phil. Jour. Sci. 7: 16. 1912.

This species has been recorded from Negros, Leyte, and Mindanao in the Philippines; it has not previously been transferred from *Dendrobium*.

Diplocaulobium cyclobulbon (Schltr.) A. D. Hawkes, comb. nov.

Dendrobium cyclobulbon Schltr. in Fedde, Repert. Spec. Nov., Beih. 1: 461. 1912.

A native of New Guinea, this species has not previously been transferred from *Dendrobium*.

Diplocaulobium dichrotropis (Schltr.) A. D. Hawkes, comb. nov.

Dendrobium dichrotropis Schltr. in Fedde, Repert. Spec. Nov., Beih. 1: 462. 1912.

This species was described from New Guinea; it has not previously been transferred from *Dendrobium*.

Diplocaulobium Franssenianum (J. J. Sm.) A. D. Hawkes, comb. nov.

Dendrobium Franssenianum J. J. Sm. in Meded. Herb. Leid., No. 23: 8. 1915.

This Sumatran species has not previously been transferred from *Dendrobium*.

Diplocaulobium gibbiferum (J. J. Sm.) A. D. Hawkes, comb. nov.

Dendrobium gibbiferum J. J. Sm. in Nova Guinea 14: 405. 1929.

A native of New Guinea, this species has not previously been transferred from *Dendrobium*.

Diplocaulobium guttulatatum (Schltr.) A. D. Hawkes, comb. nov.

Dendrobium guttulatatum Schltr. in Fedde, Repert. Spec. Nov., Beih. 1: 473. 1912.

Indigenous to the Maboro Mountains of New Guinea, this species has not previously been transferred to *Diplocaulobium*.

Diplocaulobium iboense (Schltr.) A. D. Hawkes, comb. nov.

Dendrobium iboense Schltr. in Fedde, Repert. Spec. Nov., Beih. 1: 474. 1912.

This orchid, which has been collected in the Ibo and Finisterre Mountains of New Guinea, has not previously been transferred to *Diplocaulobium*.

Diplocaulobium jadunae (Schltr.) A. D. Hawkes, comb. nov.*Dendrobium jadunae* Schltr. in Fedde, Repert. Spec. Nov., Beih. 1: 463. 1912.

A native of New Guinea, this plant has not previously been transferred from *Dendrobium* to *Diplocaulobium*.

Diplocaulobium mamberamense (J. J. Sm.) A. D. Hawkes, comb. nov.*Dendrobium mamberamense* J. J. Sm. in Nova Guinea 14: 400. 1929.

This New Guinean species has not previously been transferred to *Diplocaulobium*.

Diplocaulobium minjemense (Schltr.) A. D. Hawkes, comb. nov.*Dendrobium minjemense* Schltr. in Fedde, Repert. Spec. Nov., Beih. 1: 464. 1912.

This New Guinean species has not previously been transferred to *Diplocaulobium*.

Diplocaulobium Mischobulbum (Schltr.) A. D. Hawkes, comb. nov.*Dendrobium Mischobulbum* Schltr. in Fedde, Repert. Spec. Nov., Beih. 1: 471. 1912.

A native of the Finisterre Mountains of New Guinea, this species has not previously been transferred to *Diplocaulobium*.

Diplocaulobium pulvilliferum (Schltr.) A. D. Hawkes, comb. nov.*Dendrobium pulvilliferum* Schltr. in Fedde, Repert. Spec. Nov., Beih. 1: 471. 1912.

This New Guinean species has not previously been transferred from *Dendrobium*.

Diplocaulobium recurvifolium (J. J. Sm.) A. D. Hawkes, comb. nov.*Dendrobium recurvifolium* J. J. Sm. in Nova Guinea 14: 404. 1929.

A native of New Guinea, this species has not previously been transferred to *Diplocaulobium*.

Diplocaulobium regale (Schltr.) A. D. Hawkes, comb. nov.*Dendrobium regale* Schltr. in Fedde, Repert. Spec. Nov., Beih. 1: 476. 1912.

This species has been collected in the Finisterre and Dischore Mountains of New Guinea; it has not previously been transferred from *Dendrobium*.

Diplocaulobium regale* (Schltr.) A. D. Hawkes var. *euanthum* (Schltr.) A. D. Hawkes, comb. nov.Dendrobium regale* Schltr. var. *euanthum* Schltr. in Fedde, Repert. Spec. Nov., Beih. 1: 477. 1912.

This variant occurs in New Guinea's Kani Mountains; it has not previously been transferred to *Diplocaulobium*.

Diplocaulobium savannicola (Schltr.) A. D. Hawkes, comb. nov.*Dendrobium savannicola* Schltr. in Fedde, Repert. Spec. Nov., Beih. 1: 464. 1912.

A native of New Guinea, this species has not previously been transferred to *Diplocaulobium*.

Diplocaulobium schouteniense (J. J. Sm.) A. D. Hawkes, comb. nov.
Dendrobium schouteniense J. J. Sm. in Nova Guinea 14: 406. 1929.

A native of Schouten Island, off northern New Guinea, this species has not previously been transferred to *Diplocaulobium*.

Diplocaulobium stelliferum (J. J. Sm.) A. D. Hawkes, comb. nov.
Dendrobium stelliferum J. J. Sm. in Nova Guinea 14: 399. 1929.

This species was described from New Guinea; it has not previously been transferred from *Dendrobium*.

Diplocaulobium tortitepalum (J. J. Sm.) A. D. Hawkes, comb. nov.
Dendrobium tortitepalum J. J. Sm. in Nova Guinea 14: 402. 1929.

A native of New Guinea, this species has not previously been transferred from *Dendrobium*.

Diplocaulobium tropidophorum (Schltr.) A. D. Hawkes, comb. nov.
Dendrobium tropidophorum Schltr. in Fedde, Repert. Spec. Nov., Beih. 1: 460. 1912.

This species was described from New Guinea; it has not previously been transferred to *Diplocaulobium*.

Diplocaulobium vanilliodorum (J. J. Sm.) A. D. Hawkes, comb. nov.
Dendrobium vanilliodorum J. J. Sm. in Fedde, Repert. Spec. Nov. 12: 396. 1913.

This species has not previously been transferred to *Diplocaulobium*.

Diplocaulobium xanthocaulon (Schltr.) A. D. Hawkes, comb. nov.
Dendrobium xanthocaulon Schltr. in Fedde, Repert. Spec. Nov., Beih. 1: 475. 1912.

A native of New Guinea, this species has not previously been transferred from *Dendrobium*.

4. ERIA Ldl.

Eria Gagnepaini, Hawkes & Heller, nom. nov.
Trichotosia Simondii Gagnep. in Bull. Mus. Hist. Nat. Paris II, 22: 505. 1950, not
Eria Simondii Gagnep. 1950.

Trichotosia Bl. is now considered referable to *Eria* Ldl., but since we already have an *Eria Simondii* Gagnep., a new name must be proposed for *Trichotosia Simondii* Gagnep. The new epithet for this species from Tonkin is given in honor of Dr. François Gagnepain, noted student of the Orchidaceae and particularly that of Indochina.

Eria Hawkesii, A. H. Heller, nom. nov.
Eria bifalcis Schltr. in Fedde, Repert. Spec. Nov., Beih. 1: 670. 1912, not Ldl., 1859.

Because of the prior use by Lindley of the specific epithet, a new name must be found for this New Guinean *Eria*. The new epithet is given in honor of Alex D. Hawkes, Editor of *The Orchid Journal*.

Eria Hawkesii A. H. Heller var. **subnormalis** (Schltr.) Hawkes & Heller, comb. nov.

Eria bifalcis Schltr. var. *subnormalis* Schltr. in Fedde, Repert. Spec. Nov., Beih. 1: 670. 1912.

This variant of *Eria bifalcis* Schltr. has not previously been transferred.

Eria Helleri, A. D. Hawkes, nom. nov.

Eria cristata Ridl. in Jour. As. Soc. Straits 39: 78. 1903, not Rolfe, 1892.

Rolfe's *Eria cristata* is a Burmese plant which differs materially from the present one of Ridley, a native of the Malay Peninsula, therefore a new name is needed for the latter species. The new epithet is given in honor of A. H. Heller.

Eria Hosokawae, Hawkes & Heller, nom. nov.

Dendrobium reptans Franch. & Savat., Enum. Pl. Jap. 2: 510. 1879. *Callista reptans* O. Ktze., Rev. Gen. Pl. 2: 655. 1891. *Eria reptans* Schltr. in Fedde, Repert. Spec. Nov., Beih. 4: 219. 1919, not Ridl., 1908.

This Japanese plant appears best placed in *Eria* Ldl., but because of the prior use of the epithet *reptans* by Ridley for a different Malayan species, a new name becomes necessary. The new epithet is given in honor of Prof. Dr. T. Hosokawa, of the Biological Institute, Kyushu University, Fukuoka, Japan, an ardent student of the intricacies of the Orchidaceae.

Eria Katherinae, A. D. Hawkes, nom. nov.

Eria longicaulis Schltr. in Engl., Bot. Jahrb. 58: 127. 1923, not Teijsm. & Binn., 1862.

Schlechter's *E. longicaulis* was described from New Guinean materials, while the earlier *E. longicaulis* of Teijsmann and Binnendijk is now referable to *E. compressa* (Bl.) Bl., a totally distinct species from Java. The new epithet is given in honor of Katherine Hawkes Chatham, the senior author's mother.

Eria Kraenzliniana, Hawkes & Heller, nom. nov.

Trichotosia longissima Krzl. in Engl., Bot. Jahrb. 44, Beibl. 101: 23. 1910. *Eria longissima* J. J. Sm. in Fedde, Repert. Spec. Nov. 32: 255. 1933, not Ames & Quis., 1931.

Eria longissima J. J. Sm. was based on *Trichotosia longissima* Krzl., but because of the earlier use of that name by Ames and Quisumbing for a different Philippine species, a new epithet must be found for the present plant. We propose that it be called *Eria Kraenzliniana*, in memory of Dr. Fritz Kraenzlin, who for many years devoted his talents to a study of the Orchidaceae.

Eria pleistophylla (Krzl.) Hawkes & Heller, comb. nov.

Trichotosia pleistophylla Krzl. in Engl., Pflanzenr. 4, 50, ii, B, 21 (2): 160. 1911.

This species from Celebes has not previously been transferred from *Trichotosia*, a genus which we consider to be referable to *Eria*.

Eria sarawakensis (Carr) Hawkes & Heller, comb. nov.

Trichotosia sarawakensis Carr in Gard. Bull. Straits Settlem. 8: 100. 1935.

This species from Sarawak has not previously been transferred from *Trichotosia*.

Eria Summerhayesiana, Hawkes & Heller, nom. nov.

Eria decipiens Summerh. in Kew Bull. 307. 1929, not Schltr., 1911.

Schlechter's *Eria decipiens*, dating from 1911, is now referred to *Dendrobium aporoides* (Ldl.) Merr., but because of its prior date, *Eria decipiens* Summerh., 1929, requires a new name. The new epithet for this Burmese orchid is given in honor of Dr. Victor S. Summerhayes, of the Royal Botanic Gardens, Kew, England.

Notes on Fungi from Assam, II.

S. CHOWDHURY

(Plant Pathological Laboratory, Jorhat, Assam, India)

18. *ASTERINA HOLARRHENAE* Ryan in *Mem. Dept. Agric. India, Bot. Ser.* xv, 5, 103, 1928; Butler and Bisby, *Sci. Monogr. Coun. agric. Res. India*, i, 16, 1931.

Occurs on the upper surface of the leaves in distinct patches, 2–3 mm. in diameter. Perithecia numerous, round, radiate, carbonaceous; margin fimbriate and light brown, ostiolate, 115–214 μ in diameter. Mycelium grey-brown, straight, 4 μ thick. Hyphopodia sessile, alternate, 3-lobed, 4 x 10 μ , one-celled. Asci spherical, 34–44 μ in diameter. Spores 2-celled, 26–30 x 12 μ , brown, the free end of each cell rounded smooth.

On *Holarrhena antidysenterica* Wall., Laitkynsew, 7.xi.56, leg. S. Chowdhury.

19. *USTILAGO CRUS-GALLI* Tracy and Earle in *Bull. Torrey bot. Cl.* xxii, 175, 1895; Mundkur, *Indian J. agric. Sci.* xiii, 632, 1943; Mundkur and Thirumalachar, *Ustilaginales of India*, 27, 1952; Fischer, *Manual of North American Smut Fungi*, 255, 1953.

Syn. Cintractia seymouriana P. Magnus in *Ber. dtsh. bot. Ges.* xiv, 217, 1896; *Cintractia crus-galli* (Tracy and Earle) P. Magnus in *Ber. dtsh. bot. Ges.* xiv, 392, 1896; Saccardo, *Syll. Fung.* xiv, 421, 1899.

Sori entirely destroying the inflorescence, also in stems, especially at nodes on young shoots, and in the axils of older leaves; shoot infection causing considerable deformity resulting in a twisted mass of leafy shoots with sometimes aborted ears; sori large, those on the stems up to half an inch in diameter, swollen, covered with a hispid grey membrane of host tissue, exposing a pulverulent spore mass. Spores spherical to slightly ellipsoidal, Mikado-brown, 9–13 μ in diameter; epispore thick, covered with blunt, dense echinulations, sometimes verruculose.

In the inflorescence of *Echinochloa frumentacea* (Roxb.) Link., Lylyngkot, 6.xi.56, leg. S. Chowdhury.

20. *USTILAGO IMPERATAE* Mundkur in *Indian J. agric. Sci.* xiv, 49, 1944; Mundkur and Thirumalachar, *Ustilaginales of India*, 30, 1952.

Sori entirely destroying the inflorescence, enclosed by the sheath and covered by a greyish membrane of host tissue which later wears away revealing a black, pulverulent spore mass; columella in the form of long shreds; no sterile cells. Spores spherical to oval, some slightly triangular, with granular contents, natal-brown, 12–20 μ in diameter; epispore thick, smooth.

In the inflorescence of *Imperata cylindrica* Beauv. Nagajuri, 23. viii.56, leg. S. Chowdhury.

21. *ACROTHECIUM PENNISETI* Mitra in *Mem. Dep. Agric. India, Bot. Ser.* xi, 3: 57–74, 1921; Butler and Bisby, *Sci. Monogr. Coun. agric. Res. India*, i, 139, 1931.

Spots amphigenous on leaves and glumes, 2–5 cm. long and 0.5–1 cm. broad, dirty brown with yellowish margin, on the leaves more common along the edge and tip. Conidiophores rigid, erect, simple, 3–5 septate, straight or slightly bent, fasciculate or solitary, tip swollen or flexuous, olive-brown to dirty brown, with paler tips, base sometimes swollen, $65\text{--}150 \times 6\text{--}9 \mu$. Conidia borne acrogenously on the conidiophore, forming a group of 2–5 spores, clavate, pear-shaped or slightly bent, thick-walled, 2–3 septate, sometimes constricted at the septa, olive-brown to dirty brown, $28\text{--}45 \times 16\text{--}20 \mu$, end cells lighter in color, middle cell broader and deep in color.

On the leaves and ears of *Pennisetum typhoides* Stapf and Hubbard, Jorhat, 1.xi.56, leg. S. Chowdhury.

22. ***Cercospora assamensis***, sp. nov. (Fig. 1).

Leaf spots on the upper surface of the leaf, 0.5 to 6 mm. in diameter, often adjacent spots coalesce and larger spots formed, at first dark

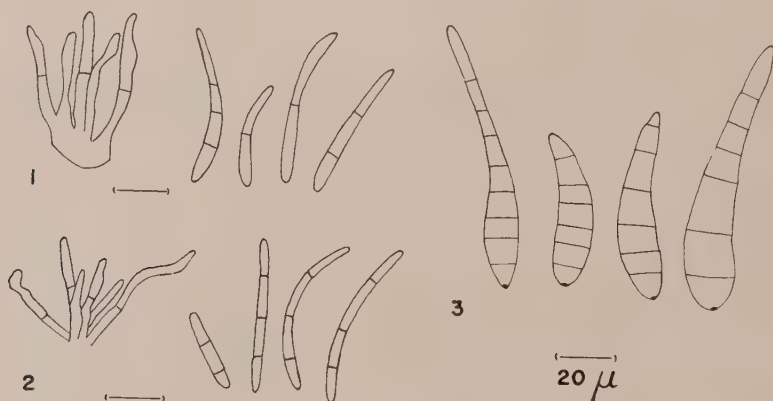


FIG. 1. Conidiophore and conidia of *Cercospora assamensis* Chowdhury, n. sp.

FIG. 2. Conidiophore and conidia of *Cercospora vanqueriae* Chowdhury, n. sp.

FIG. 3. Conidia of *Helminthosporium crotalariae* Chowdhury, n. sp.

brown, later center becoming light brown with a darker raised border all around; fruiting on both sides; stromata a few brown cells to 27μ in diameter, dark brown; conidiophores in fascicles, a few to many short, brown in color, apex lighter, septate, non-branched, rarely geniculate, $33\text{--}75 \times 3\text{--}5 \mu$. Conidia obclavate-cylindric, straight or slightly curved, 0–3 septate, hyaline to sub-hyaline, $18\text{--}52 \times 3\text{--}4 \mu$.

On the living leaves of *Eupatorium adenophorum* Hort. (= *E. trapezoideum* Kunth), Shillong, 11.xi.56, leg. S. Chowdhury.

Type specimen deposited in the *Herb. Crypt. Indiae Orient.*, Indian Agricultural Research Institute, New Delhi.

Foliorum maculae in pagina superiore, 0.5–6 mm. diam., saepe coalescentes ad efformandas maculas ampliores, primo fusce brunneae, postea pallide brunneae in centro, fusciore ad margines elevatos evadentes. Fructificationes in utraque pagina. Stromata e paucis

cellulis brunneis ad $27\ \mu$ diam., fusce brunnea. Conidiophori fasciculati, nonnulli vel plures, breves, brunnei, pallidiores ad apicem, septati, non ramosi, raro geniculati, $33\text{--}75 \times 3\text{--}5\ \mu$; conidia obclavato-cylindrica, recta vel tenuiter curvata, 0-3 septata, hyalina vel subhyalina, $18\text{--}52 \times 3\text{--}4\ \mu$.

Typus lectus in foliis vivis *Eupatorium adenophorum* Hort. (= *E. trapezoideum* Kunth), Shillong, 11.xi.56, leg. S. Chowdhury, et positus in *Herb. Crypt. Indiae Orientalis*, Indian Agricultural Research Institute, New Delhi.

23. CERCOSPORA BOEHMERIAE Peck in *N. Y. State Mus. Nat. Hist. Ann. Rept.* 34: 38, 1881; Chupp, *A Monograph of the fungus genus Cercospora*, 582-83, 1953.

C. boehmeriae Fukui *J. Plant Prot.* 5, 734, 1918.

C. fukuui Yam. *J. Soc. Trop. Agr.* 6: 601, 1934.

Leaf spots circular to angular, 1-8 mm. in diameter, dark brown to nearly black in color, center of the spots later turning grayish, adjacent spots often coalesce; fruiting chiefly hypophyllous; conidiophores in fascicles, short, pale, olivaceous brown, sometimes slightly wavy, conidial scars indistinct or absent, $15\text{--}95 \times 3\text{--}4\ \mu$; conidia long, septate, cylindrical, clavate to sub-clavate, tapering towards the end, usually curved, sub-hyaline, septa mostly not prominent, $40\text{--}120 \times 3\text{--}4\ \mu$.

On the living leaves of *Boehmeria nivea* Hook et Arn, Jorhat, 12.x.56, leg. S. Chowdhury.

24. CERCOSPORA DATURICOLA (Spegazzini) Ray in *Mycologia* 36: 175, 1944; Chupp, *A Monograph of the fungus genus Cercospora*, 537, 1953.

Cercosporina daturicola Spegazzini, *Anales Mus. Nac. B. Aires* 20: 425, 1910.

Cercospora abchazica Siemaszko, *Bul. du Musée du Caucase* 12: 26, 1919.

Leaf spots circular, 2-6 mm. in diameter, tan to medium brown or with center almost white with a darker border; fruiting amphigenous; stromata none or a thin layer of very pale olivaceous cells; conidiophores borne singly or in groups, divergent, very pale olivaceous, uniform in color, attenuated above each of the 1-5 abrupt geniculations, 0-3 indistinctly septate, not branched, straight to bent, sub-truncate tip, $20\text{--}112 \times 3\text{--}6\ \mu$; conidia hyaline, acicular, indistinctly multiseptate, straight to mildly curved, base truncate, tip sub-acute, $35\text{--}140 \times 3\text{--}5\ \mu$.

On the leaves of *Datura stramonium* L., Kokilamukh, 10.ii.57, leg. S. Chowdhury.

25. CERCOSPORA ERYTHRINICOLA Tharp in *Mycologia* 9: 109, 1917; Chupp, *A Monograph of the fungus genus Cercospora*, 305-6, 1953.

Leaf spots circular to sub-circular, 2 to 10 mm. in diameter, often adjacent spots coalesce and form larger spots, grayish brown or grayish with a dark border; fruiting amphigenous but more abundant on the upper surface where definite fascicles are formed, stromata lacking or only a few brown cells; conidiophores pale to medium brown, slightly paler and narrower towards the tip, septate, not branched, straight to curved or undulate, sparingly geniculate, $35\text{--}140 \times 4\text{--}6\ \mu$. Conidia hyaline, acicular, straight to mildly curved, indistinctly multiseptate, base truncate, tip acute to sub-acute, $41\text{--}138 \times 3\text{--}5\ \mu$.

On the leaves of *Erythrina stricta* Roxb., Jorabat, 13.xi.56, leg. S. Chowdhury.

26. CERCOSPORA RICINELLA Saccardo and Berlese in *Atti R. Ist. Ven. Sci. Lett. Arti.* vi, 3, 721, 1885; Chupp, *A Monograph of the fungus genus Cercospora*, 229, 1953; Mundkur, *Fungi of India, Supplement i*, 32, 1938.

Cercospora albido-maculans Wint. *Hedwigia* 24: 202, 1885. *J. Mycol.* 1: 124, 1885.

Cercospora ricini Speg. *Anal. Mus. Nac. B. Aires Ser. 2*, 3: 343, 1899. *Cercosporina ricinella* (Sacc. & Berl.) Speg. *Anal. Mus. Nac. B. Aires.* 20: 429, 1910.

Leaf spots circular, 0.5 to 10 mm. in diameter, usually a minute white dot with a dark brown to reddish brown border, but sometimes uniformly brown or grayish blotches. Fruiting amphigenous, but more abundant on lower surface. Stromata a few brown cells to 50 μ in diameter; fascicles mostly dense. Conidiophores pale brown, fairly uniform in color and width, sparingly septate, not branched, straight or 1-2 abruptly geniculate, medium spore scar at sub-truncate tip, 12-98 x 4-5 μ . Conidia hyaline, acicular to obclavate or rarely almost cylindric, straight to mildly curved, indistinctly multiseptate, base truncate, tip sub-obtuse to sub-acute, 15-150 x 3-5 μ .

On the leaves of *Ricinus communis* L., Kokilamukh, 12.xii.56, leg. S. Chowdhury.

27. CERCOSPORA SENECONICOLA J. J. Davis in *Trans. Wisc. Acad. Sci. Arts & Letters* 30: 10, 1937; Chupp, *A Monograph of the fungus genus Cercospora*, 158, 1953.

Spots on the upper surface of the leaf, circular to subcircular, 3 to 7 mm. in diameter, at first dark brown, later center light brown with a darker border. Stromata slight, mostly in stomatal openings; fascicles mostly dense. Conidiophores pale, olivaceous brown, slightly paler and narrower toward the tip, septate, undulate to tortuous, 12-48 x 4-5 μ . Conidia hyaline, acicular to obclavate, straight to curved, septa indistinct, base truncate to sub-truncate, tip acute, 30-50 x 2-4 μ .

On the leaves of *Senecio densiflora* Wall., Mamluh, 7.xi.56, leg. S. Chowdhury.

28. CERCOSPORA SUBSESSILIS H. & P. Sydow in *Ann. Mycol.* 11: 329, 1913; Chupp, *A Monograph of the fungus genus Cercospora*, 386, 1953; Butler and Bisby, *Sci. Monogr. Counc. agric. Res. India*, i, 143, 1931.

Cercoseptoria domingensis Ciferri, *Ann. Mycol.* 36: 231, 1938.

Leaf spots circular to angular, 2-4 mm. in diameter, tan, gray or pale brown in color, each spot surrounded by a dark brown line, often the tissue falls away; fruiting hypophyllous; stromata globular, pale olivaceous to dark brown. Conidiophores in fascicles very pale yellowish olivaceous, tip narrow, hyaline, not septate, not branched, not geniculate, straight to slightly undulate, 5-22 x 2-4 μ . Conidia sub-hyaline, often appearing hyaline when not in mass, narrowly cylindric or slightly attenuated, straight to mildly curved, 3-9 septate, ends rounded or base short obconically truncate, 20-85 x 2-4 μ .

On the leaves of *Melia azadirachta* L., Barbheta, 12.x.56, leg. S. Chowdhury.

29. *CERCOSPORA* TERNATEAE Petch in *Ann. Roy. bot. Garden Peradeniya* 5, 4: 306, 1909; Butler and Bisby, *Sci. Monogr. Counc. agric. Res. India*. i, 143, 1931; Saccardo, *Syll. Fung.* 22: 1419; Chupp, *A Monograph of the fungus genus Cercospora*, 336-337, 1953.

Cercospora pantoleuca H. & P. Sydow, *Phillip. J. Sci. (Botany)* 8: 284, 1913.

Cercospora clitoridis Fragosa & Ciferri, *Bol. Real. Soc. Espanola Hist. Nat. Madrid* 25: 456, 1925.

Leaf spots circular to sub-circular, 1-5 mm. in diameter, dark brown to black, later with a gray center, similar spots on pods; fruiting amphigenous but chiefly epiphyllous; stromata slight. Conidiophores in fascicles, pale olivaceous brown, often with hyaline tip, usually attenuated, sparingly septate, not branched, geniculate, spore scars present, $25-135 \times 3-6 \mu$. Conidia hyaline, acicular, straight to mildly curved, indistinctly septate, base truncate, tip sub-acute, $22-122 \times 2-4 \mu$.

On the leaves and fruits of *Clitoria ternatea* L., Kokilamukh, 27.xi.56, leg. S. Chowdhury.

30. *Cercospora vanqueriae*, sp. nov. (Fig. 2).

Spots on the upper surface of the leaf, 0.5 to 5 mm. in diameter, sub-circular, often adjacent spots coalesce and form larger irregular spots, light reddish brown with raised border and often with concentric rings; fruiting on both sides of the leaf, more on the upper; stromata globular, dark brown, up to 24μ in diameter; conidiophores in fascicles, brown, paler towards the tip, septate, not branched, rarely geniculate, $10-56 \times 3-5 \mu$; conidia sub-hyaline to light olivaceous, obclavate-cylindric, straight to mildly curved, 0-4 septate, base obconically truncate, tip conic to obtuse, $18-90 \times 3-4 \mu$, often in chains of two or more.

On the living leaves of *Vanqueria spinosa* Roxb., Kokilamukh, 11.x.56, leg. S. Chowdhury.

Type specimen deposited in the *Herb. Crypt. Indiae Orient.* Indian Agricultural Research Institute, New Delhi.

Maculae in pagina superiore foliorum, 0.5-5 mm. diam., sub-circulares, saepe coalescentes ad efformandas maculas ampliores irregulares, pallide rubro-brunneae, margine elevato, annulis concentricis saepe ornatae. Fructificationes in utraque pagina foliorum, frequentiores vero in superiore; stromata globularia, fusce brunnea, usque ad 24μ diam.; conidiophori fasciculati, brunnei, pallidiores ad apicem, septati, non ramosi, raro geniculati, $10-56 \times 3-5 \mu$; conidia subhyalina vel pallide olivacea, obclavato-cylindrica, recta vel curvata, 0-4-septata, truncata ad basim obconice, conica vel obtusa ad apicem, $18-90 \times 3-4 \mu$, saepe bina vel plura in catenulas disposita.

Typus lectus in foliis vivis *Vanqueria spinosa* Roxb., in loco Kokilamukh, 11.x.56, leg. S. Chowdhury, et positus in *Herb. Crypt. Indiae Orientalis*, Indian Agricultural Research Institute, New Delhi.

31. *Helminthosporium crotalariae* sp. nov. (Fig. 3).

Spots on the upper side of the leaf, circular to sub-circular, 2-8 mm. in diameter, brown with a darker border. Conidiophores in fascicles,

a few to many, dark brown, lighter at the tip, geniculate, septate, 78–188 x 6–8 μ . Conidia both lateral and terminal, clavate, straight or slightly curved, pale olivaceous, 60–206 x 11–19 μ , septate, bearing a distinct hilum at the base.

On the upper side of the living leaves of *Crotalaria juncea* L., Kokilamukh, 10.x.56, leg. S. Chowdhury.

Type specimen deposited in the *Herb. Crypt. Indiae Orient.* Indian Agricultural Research Institute, New Delhi.

Maculae in pagina superiore foliorum, circulares vel subcirculares, diametientes 2–8 mm., brunneae, marginibus fuscioribus. Conidiophori fasciculati, septati, 78–188 x 6–8 μ . Conidia et lateralialia et terminalia, clavata, recta vel paulisper curvata pallide olivacea, 60–206 x 11–19 μ , septata, ornata ad basim hilo distincto.

Typus lectus in pagina superiore foliorum viventium *Crotalaria juncea* Linn. in loco Kokilamukh, 10.x.56, leg. S. Chowdhury et positus in *Herb. Crypt. Indiae Orientalis*, Indian Agricultural Research Institute, New Delhi.

The author's thanks are due to Father H. Santapau, St. Xavier's College, Bombay for the preparation of the Latin diagnoses of the new species and Dr. J. C. F. Hopkins, Director, Commonwealth Mycological Institute, Kew, for furnishing information about occurrence of *Helminthosporium* on *Crotalaria*.